United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

In Reply Refer to:
08ESMF00-
2018-F-3331-1

MAR 2 7 2019

Mr. Alessandro Amaglio
Regional Environmental Officer, Region IX
Federal Emergency Management Agency
1111 Broadway, Suite 1200
Oakland, California 94607

Subject: Programmatic Formal Section 7 Consultation on Federal Emergency Management Agency's Disaster, Mitigation, and Preparedness Programs within the Sacramento Fish and Wildlife Office's Jurisdiction, California

Dear Mr. Amaglio:

This letter is in response to the Federal Emergency Management Agency's (FEMA) request to initiate formal section 7 consultation under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act), and provides the U.S. Fish and Wildlife Service's (Service) programmatic biological opinion on FEMA's Disaster, Mitigation, and Preparedness Programs (proposed project) in California as described in FEMA's June 20, 2018 *Programmatic Biological Assessment for Disaster, Mitigation, and Preparedness Programs in California* (programmatic biological assessment). We received your June 20, 2018, letter requesting initiation of consultation in our Sacramento Fish and Wildlife Office (SFWO) on June 20, 2018. On September 14, 2018, we received a letter from FEMA changing effects determinations for 20 species. At issue are the effects of FEMA's proposed action on 35 federally-listed species and their designated or proposed critical habitats which the Sacramento Fish and Wildlife Office has lead responsibility and seven federally-listed species and their critical habitat which occur within the jurisdiction of the Sacramento Fish and Wildlife Office but for which other Service field offices have lead responsibility. FEMA requested formal consultation based on your determination that the proposed project may affect, and is likely to adversely affect the following 17 federally-listed species and their designated critical habitat, and may affect, but not likely to adversely affect the following 25 federally-listed species and their designated critical habitat.

<u>Sacramento Fish and Wildlife Office Species</u>

Likely to Adversely Affect

California red-legged frog (*Rana draytonii*) (Threatened) and critical habitat
California tiger salamander (*Ambystoma californiense*)
- Central California DPS (Threatened) and critical habitat
- Sonoma DPS (Endangered) and critical habitat

Giant garter snake (Threatened) (*Thamnophis gigas*)
Alameda whipsnake (*Masticophis lateralis euryxanthus*) (Threatened) and critical habitat
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (Threatened) and critical habitat

California freshwater shrimp (*Syncaris pacifica*) (Endangered)
Bay checkerspot butterfly (*Euphydryas editha bayensis*) (Threatened) and critical habitat
Callippe silverspot butterfly (*Speyeria callippe callippe*) (Endangered)
Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*) (Endangered)
Vernal pool fairy shrimp (*Branchinecta lynchi*) (Threatened) and critical habitat
Vernal pool tadpole shrimp (*Lepidurus packardi*) (Endangered) and critical habitat
Conservancy fairy shrimp (*Branchinecta conservatio*) (Endangered) and critical habitat
Longhorn fairy shrimp (*Branchinecta longiantenna*) (Endangered) and critical habitat
Sacramento Orcutt grass (*Orcuttia viscida*) (Endangered) and critical habitat

Not Likely to Adversely Affect
Mission blue butterfly (*Icaricia icarioides missionensis* [= *Plebejus icarioides missionensis*]) (Endangered)
San Bruno elfin butterfly (*Callophrys mossii bayensis*) (Endangered)
Burke's goldfields (*Lasthenia burkei*) (Endangered)
Butte County meadowfoam (*Limnanthes floccosa* ssp. *californica*) (Endangered) and critical habitat
Calistoga allocarya (*Plagiobothrys strictus*) (Endangered)
Colusa grass (*Neostapfia colusana*) (Threatened) and critical habitat
Contra Costa goldfields (*Lasthenia conjugens*) (Endangered) and its critical habitat
Few-flowered navarretia (*Navarretia leucocephala* ssp. *pauciflora* [=*N. pauciflora*]) (Endangered)
Fleshy owl's-clover (*Castilleja campestris* ssp. *succulenta*) (Threatened) and critical habitat
Greene's tuctoria (*Tuctoria greenei*) (Endangered) and critical habitat
Hairy Orcutt grass (*Orcuttia pilosa*) (Endangered) and critical habitat
Hoover's spurge (*Chamaesyce hooveri* [=*Euphorbia hooveri*]) (Threatened) and critical habitat
Lake County stonecrop (*Parvisedum leiocarpum* [=*Sedella leiocarpa*]) (Endangered)
Loch Lomond coyote thistle (*Eryngium constancei*) (Endangered)
Many-flowered navarretia (*Navarretia leucocephala* ssp. *plieantha*) (Endangered)
San Joaquin Orcutt grass (*Orcuttia inaequalis*) (Threatened) and critical habitat
Sebastopol meadowfoam (*Limnanthes vinculans*) (Endangered)
Slender Orcutt grass (*Orcuttia tenuis*) (Threatened) and critical habitat
Solano grass (*Tuctoria mucronata*) (Endangered) and critical habitat
Sonoma sunshine (*Blennosperma bakeri*) (Endangered)

<u>Carlsbad Fish and Wildlife Office Species</u>

Likely to Adversely Affect
Least bell's vireo (*Vireo bellii pusillus*) (Endangered)

May Affect, Not Likely to Adversely Affect
California least tern (*Sterna antillarum browni*) (Endangered)
Southwestern willow flycatcher (*Empidonax traillii extimus*) (Endangered) and critical habitat

<u>Ventura Fish and Wildlife Office Species</u>

Likely to Adversely Affect
Tidewater goby (*Eucyclogobius newberryi*) (Endangered) and critical habitat

<u>Arcata Fish and Wildlife Office Species</u>

May Affect, Not Likely to Adversely Affect
Western snowy plover (*Charadrius nivosus* ssp. *nivosus*) (Threatened) and critical habitat

Marbled murrelet (*Brachyramphus marmoratus*) (Threatened) and critical habitat

Yreka Fish and Wildlife Office Species

May Affect, Not Likely to Adversely Affect
Northern spotted owl (*Strix occidentalis caurina*) (Threatened) and critical habitat

Based on our review of the information provided in FEMA's June 20, 2018, programmatic biological assessment, the Service concurs that the proposed project may affect, but is not likely to adversely affect the 25 federally-listed species listed above and their respective critical habitat. The general avoidance and minimization measures and species-specific conservation measures will help ensure that adverse effects to the species from proposed project activities are likely to be insignificant. If any activity proposed by a FEMA Subapplicant (entity that has applied to receive a FEMA grant administered by the state or federally-recognized tribe) demonstrates the potential to adversely affect any of these 25 species or their critical habitat, that project will not be covered by this programmatic biological opinion and FEMA will submit that project for formal consultation.

The remainder of this document provides our programmatic biological opinion on the effects of the proposed action on the remaining 17 species.

This programmatic biological opinion is based on information provided in the following: (1) FEMA's *Programmatic Biological Assessment for Disaster, Mitigation, and Preparedness Programs in California*, dated June 20, 2018; (2) FEMA's September 14, 2018 letter changing effects determinations for 20 species; (3) conversations and emails between the Service (C. Martin and J. Knight) and FEMA staff or their contracted agents, (S. Amaglio, L. Solorzano-Vincent.); (4) conversations between FEMA and other Service biologists from the Ventura, and Arcata Fish and Wildlife Offices; and (4) information contained in Service files.

A complete administrative record of this consultation is on file at the Sacramento Fish and Wildlife Office (Service File No. 08ESMF00-2018-F-3331).

Consultation History

March 2017 – January 2018	Weekly coordination calls between the Sacramento Fish and Wildlife Office, other Service field offices, and FEMA.
March 2017 – May 2018	Correspondence exchange and meetings between the Sacramento Fish and Wildlife Office, other Service field offices, and FEMA.
January 11, 2018	Received the Draft Programmatic Biological Assessment from FEMA.
April 17, 2018	Received additional supplemental information for the Draft Biological Assessment.
May 2, 2018	Provided final comments on the Draft Programmatic Biological Assessment.
June 20, 2018	Received a Programmatic Biological Assessment from FEMA.

September 14, 2018 Received a letter from FEMA changing the effects determinations for 20 species from Likely to Adversely Affect to Adversely Affect.

PROGRAMMATIC BIOLOGICAL OPINION

Scope of the Consultation

This document is a programmatic biological opinion for FEMA's disaster, mitigation, and preparedness program (proposed action) within the Sacramento Fish and Wildlife Office's Jurisdiction in California. This is designed to facilitate FEMA's compliance with the Act for projects of a similar nature that occur as a result of Presidentially-declared disasters, and that are likely to adversely affect 17 federally-listed species and their respective designated or proposed critical habitats within the Sacramento Fish and Wildlife Office's jurisdiction. It is intended to provide Section 7(a)(2) compliance to FEMA for the proposed projects from applicants and sub-grantees (Subapplicants) requesting funding under FEMA's disaster, mitigation, and preparedness program in California. It does not cover emergency consultations or FEMA's implementation of the National Flood Insurance Program.

This programmatic biological opinion will cover a period of five years from the signature date of this document, with the potential for extension if warranted. When the 5-year period has expired or incidental take coverage under this programmatic biological opinion is met, FEMA may reinitiate a consultation to extend or amend the coverage provided in this programmatic biological opinion.

This programmatic biological opinion only applies to FEMA Subapplicants' proposed projects for which FEMA is the Lead Federal Agency for compliance under the Act. When FEMA and the U.S. Army Corps of Engineers (USACE) are both involved with a Subapplicant's proposed project, the process described in the 2015 Memorandum of Understanding (MOU) (executed in 2015, updated in 2018, and subsequent annual updates) among FEMA, USACE, Service, and NMFS will be followed to determine whether FEMA or the USACE is the lead federal agency for compliance with the Act.

Procedure to Cover Individual Projects Under this Programmatic Biological Opinion

To determine a Subapplicant's proposed project eligibility for coverage under this programmatic biological opinion, FEMA will determine whether a Subapplicant's proposed project meets the suitability criteria established under FEMA's programmatic biological assessment. If the proposed project meets the suitability criteria, FEMA will conduct a project-specific effects analysis and provide a summary of the potential direct and indirect effects associated with the covered project by submitting a completed ESA Review Form to the Service (Appendix C, programmatic biological assessment). If the covered project may result in adverse effects to species, the ESA Review Form will include:

- A brief description of the potential effects and mechanisms of take;
- A description of the general avoidance and minimization measures, the species-specific Conservation Measures, and any additional measures developed specifically for the project that the Subapplicant will implement; and
- A quantification of the incidental take anticipated.

FEMA will submit the completed ESA Review Form to the Service and request concurrence that the project is applicable for coverage under the programmatic biological opinion. The Service will

notify FEMA by electronic mail whether the Service does or does not concur with the proposed project's coverage under the programmatic biological opinion.

Description of the Proposed Programmatic Actions

Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S. Code [U.S.C.] §§ 5121–5206), as amended, FEMA is authorized to provide grant funding to state and local governments, federally-recognized tribe and individuals (referred to as Subapplicants) who are adversely affected or potentially affected by human-caused or natural disasters. FEMA provides such grants to assist Subapplicants in repairing, restoring, or replacing disaster-damaged facilities, and to provide assistance with actions that will reduce or eliminate threats to public health and safety and reduce the risk of damage to public and private property during future disasters. FEMA has determined through experience with other disasters that the majority of the typically recurring actions proposed for funding can be grouped by type of action or location. Some of these projects may directly or indirectly affect federally-listed species and their designated or proposed critical habitats. FEMA's programmatic biological assessment contains a comprehensive description of all potential actions. These are summarized below.

Non-Emergency Debris Removal

For purposes of this document, debris removal performed in non-emergency situations includes:

- Removing rock, silt, sediment, or woody debris that floodwaters have deposited in harbors and ports, stream channels, bridge and culvert openings, canals, sedimentation basins, sewage treatment ponds, ditches, and other facilities in such a manner as to disrupt normal flows, navigation, recreation, or municipal services;
- Removing woody debris and other vegetation following events that damage or destroy trees;
- Removing rock and earth from landslides caused by events such as earthquakes or heavy rains; and
- Removing rubble after earthquakes.

All removed debris will be disposed of at approved and licensed disposal sites, in compliance with existing laws and regulations. Any hazardous materials or other contaminants will be removed and disposed of in an appropriate manner. If possible, woody debris and construction materials will be recycled.

Constructing, Modifying or Relocating Facilities

FEMA is authorized to provide funds for constructing, modifying, or relocating facilities. Relevant actions include:

- Upgrading or otherwise modifying facilities;
- Providing temporary facilities;
- Acquiring and demolishing existing facilities;
- Repairing, realigning, or otherwise modifying roads, trails, utilities, and rail lines;
- Constructing new facilities or relocating existing facilities;
- Relocating the function of an existing facility; and
- Developing demonstration projects.

During construction, avoidance and minimization measures are typically used and incorporated as part of the action. These typical measures are described later in this document.

Upgrading or Otherwise Modifying Facilities

FEMA may provide funds to implement changes required by current building codes and standards, or otherwise modify existing structures. Often, these changes make the structure more resistant to damage in future events. Typical activities include:

- Making structures more fire-resistant (e.g., by replacing roofs and doors with fire-resistant materials);
- Installing bracing, shear panels, shear walls, anchors, or other features so that structures are better able to withstand seismic events or high wind or snow loads;
- Modifying structures to reduce the risk of damage during floods by elevating structures above the expected flood level or by flood proofing; and
- Modifying structures to meet another need of a Subapplicant, such as through an improved project or an alternate project under the Public Assistance Program.

Providing Temporary Facilities

FEMA may provide temporary housing facilities when a disaster renders homes uninhabitable for long periods. Such facilities typically consist of manufactured housing. Typical activities may involve:

- Developing the pads for dwellings;
- Constructing ancillary facilities, such as roads, streets, and parking lots;
- Installing utilities, such as potable water lines, sewer hookups, electricity (including street lighting), and telephones lines; and
- Installing manufactured homes.

FEMA may provide temporary facilities if other housing options are not feasible. Appropriate sites will not be located in a floodplain and do not contain wetlands or critical habitat, affect historic properties or archaeological sites, or contain hazardous materials. Installation of housing units and utilities will be accomplished in accordance with current codes and standards. After temporary housing is no longer needed at the disaster site, FEMA will remove the temporary housing units and associated ancillary facilities, and restore the land to its original use. All removed materials will be stored for future use or disposed of in accordance with applicable laws and regulations.

Another method that FEMA uses to provide temporary housing involves modifying existing facilities to serve as temporary housing. These facilities may consist of existing residential property or the adaptive reuse of non-residential facilities. Specific activities range from conducting repairs and minor upgrades to complete reconstruction of a building's interior. This action may involve acquisition or leasing of facilities. Modifying existing facilities for temporary housing may be conducted by FEMA directly or by providing funding to a Subapplicant.

FEMA also may provide funding for temporary relocation of essential public services, in the event that the structures housing these services are damaged, destroyed, or otherwise rendered inaccessible by a disaster. Funds also may be provided for upgrades necessary to meet current codes and standards, and for the installation or modification of appurtenances, such as utilities, that are necessary to operate facilities.

Acquiring and Demolishing Existing Facilities

FEMA may provide funds for the acquisition and demolition of existing facilities, particularly if they are located in high-hazard areas and are subject to repetitive loss. Typically, these facilities are at a high risk because of: (1) damage from flooding; (2) erosion of stream banks, beaches, slopes, or bluffs; (3) landslides; or (4) wildfire. These facilities may consist of private properties, such as houses and commercial buildings, or publicly owned facilities, such as utilities, roads, and bridges.

Existing facilities will be either removed or demolished. All demolition materials will be disposed of at approved and licensed disposal sites, in compliance with applicable laws and regulations. Any hazardous materials or other contaminants will be removed and disposed of in an appropriate manner. Construction debris and household materials may be recycled if recycling facilities exist. Once structures are removed, lots will be graded to conform to the local topography, and disturbed areas will be revegetated with species approved for the local area.

Repairing, Realigning or Otherwise Modifying Roads, Trails, Utilities and Rail Lines

Roads, trails, utilities (water, sewer, natural gas, power/electrical systems infrastructure), and rail lines are typically damaged when floods or heavy rains cause erosion, subsidence, or landslides. Earthquakes may cause similar damage. Repairs are accomplished by replacing earthen material lost during the disaster and replacing the damaged surface, utility line, or, in the case of rail lines, ballast, and track. Stabilizing the replacement fill using rock, grout, timber walls, or steel sheet piling may be necessary. Hazard mitigation measures may be performed to prevent or limit future damage. For example, a pipe may be installed to convey drainage beneath a road, thus preventing future washouts, or a utility line may be encased in concrete in an area vulnerable to erosion.

If the area of damage is unstable, does not allow for repair, or is subject to repetitive loss, a facility may be realigned so that the area of damage is avoided. Property acquisition or a change in easement may be necessary.

Facilities may also be modified as part of improved projects or alternate projects under the Public Assistance Program to meet additional needs of the Subapplicant.

Constructing New Facilities or Relocating Existing Facilities

If a facility is located in a floodplain or other hazardous area, is subject to repetitive damage, or has been damaged in such a way that restoration in the current location is not practical or cost-effective, FEMA may fund the construction of a new facility or the physical relocation of the existing facility. FEMA defines hazardous areas as those areas susceptible to some type of natural hazard, such as flooding, seismic activity, coastal inundation, or mudslide. Examples of this action include construction of roads, trails, utilities and utility lines, and rail lines in a different area from the existing facility; construction and relocation of buildings; construction of safe rooms; and construction of drainage improvements.

In both new facility construction and physical relocation, FEMA may fund the cost of land acquisition and the construction of appurtenant features, such as access roads and utilities. For properties in the hazard area, FEMA acquires damaged properties, demolishes existing structures (except in cases of physical relocation), and places deed restrictions that limit future uses to open space in perpetuity. However, FEMA does not acquire land directly nor does it become a land owning agency as a result of this process.

Relocating the Function of an Existing Facility

FEMA may fund relocating the function of a facility to an existing facility that has adequate capacity to handle the additional load with minor modifications, if necessary. For structures, the occupants and materials are relocated to alternative structures, traffic may use alternate routes, and utility services are provided by alternative methods. This action will not entail any major physical construction or addition to the existing facility and, if any work is required, it will consist only of minor modifications. For properties in the hazard area, FEMA may acquire damaged properties, demolish existing structures, and place deed restrictions to limit future uses to open space in perpetuity.

Developing Demonstration Projects

Demonstration projects focus on public education and are designed to highlight procedures the public can use to reduce property damage during flood, earthquake, wildfire, wind, and rainstorm disasters. Demonstration projects may involve the development of a model facility to demonstrate how hazard mitigation technologies can be used to reduce potential damage during a disaster. Flood demonstration projects may involve items such as elevating a structure or waterproofing windows and doors that are below the base flood elevation. A fire demonstration project may include vegetation management around a facility and replacing roofs, doors, and windows with fire-resistant materials. Wind and earthquake demonstration projects may include changes to the structural design of buildings to allow them to withstand higher wind velocity or more movement during an earthquake.

Actions Involving Watercourses and Coastal Features

Many FEMA funded activities pertain to inland water sources, such as streams, rivers, lakes, and coastal features such as harbors and beaches. Inland water sources may be perennial or dry during the summer months. During construction, avoidance and minimization measures typically will be used and incorporated as part of the action. Work in a stream channel often includes temporary diversion of the channel using sandbags or a cofferdam constructed of fill. Heavy equipment typically is operated from an adjacent road, bank, or other feature; however, in some cases, operating equipment in a channel area once flow has been diverted may be necessary. A pipe or a temporary secondary channel may be used to convey the diverted water.

If the action involves channel modifications, changes to the capacity of bridges and culverts, or the installation of attenuation structures, conducting hydraulic/hydrologic analyses to evaluate the changes of upstream and downstream flow rates and determine whether additional action components need to be added to address any changes in hydraulics and hydrology outside the project area may be necessary.

Relevant categories of activities include the following:

- Repairing, stabilizing, or armoring embankments;
- Creating, widening, clearing, or dredging a waterway;
- Constructing or modifying a water crossing;
- Constructing or modifying a water detention, retention, storage, or conveyance facility;
- Constructing or modifying other flood control structures; and
- Constructing or modifying a coastal feature.

Repairing, Stabilizing or Armoring Embankments

Repairing, stabilizing, or armoring embankments involves the repair of earthen or rock embankments damaged by floodwaters. Examples are natural stream banks; road, trail, and rail line embankments; embankments for irrigation and navigation canals; and levees used for flood control and reclamation. In addition to repair of damaged features, FEMA may fund measures designed to prevent damage in future flood events.

In addition to replacing fill material, embankments may be stabilized or armored through:

- Placing of rock riprap;
- Hardening with concrete or soil cement;
- Installing retaining walls, gabions, or geotextile fabrics; and/or
- Using bioengineering techniques, such as planting vegetation, placing root wads, or placing willow bundles.

A combination of these techniques may be employed. For example, rock and geotextiles, when used with root wads and willow bundles, may provide mitigation from erosion while enhancing the natural values of a stream corridor.

Creating, Widening, Clearing or Dredging a Waterway

Creating, widening, clearing, or dredging a waterway may be used to reduce the flood hazard to adjacent lands, facilities, or populated areas. New channels may be constructed to convey excess flows around flood-prone areas during flood events. Drainage swales, earthen channels, concrete channels, or subsurface concrete pipes also may be used as a means of conveyance. A new channel may be constructed in a dry environment and connected to a stream after completion. This channel may have an inlet weir higher than the elevation of the normal flow so that the normal flows remain in the natural channel. The outlet may be armored with concrete or rock riprap to prevent excessive erosion of the existing channel.

Existing channels may be widened to allow a channel to convey a larger volume of water. Conveyance may also be increased by replacing earthen banks or channel bottoms with concrete. To the extent possible, construction will be conducted from the top of the bank, but many activities may require construction equipment to work in the stream channel. In perennially flowing streams, work in a stream channel generally will be restricted to the low-flow period, and the flow will be diverted around the construction area. A pipe or a temporary secondary channel will be used to convey the diverted water.

As an alternative to constructing a bypass or modifying an existing channel, the existing channel may be cleared of vegetation or sediment to increase conveyance. This action often will be used in developed areas where modifications are not feasible, as well as in areas where years of inadequate maintenance have allowed trees and brush to grow within the channel or sediment and debris to accumulate in the channel or around culverts and bridges. Vegetation may be removed through mechanical means, by hand, or by application of herbicides. Vegetation may be removed not only from the channel but also from the banks and high-water areas, thus reducing the risk that floating debris could be trapped by trees or heavy brush. Sediment and debris may be removed by dredging, through use of heavy equipment, or by hand. All removed debris will be disposed of at approved and licensed disposal sites, in compliance with applicable laws and regulations. Woody debris and vegetation can be recycled if recycling facilities exist.

Constructing or Modifying Water Crossings

FEMA may fund the repair or replacement of damaged water crossings, the enlargement of openings to allow greater conveyance and reduce the risk that debris may be trapped during floods, or the installation of bank protection or other means to reduce the risk of erosion. Crossings may be relocated or improved to avoid high-hazard areas, repetitive damage, or areas where reconstruction is not cost-effective or feasible.

Culverts may consist of corrugated metal pipes, reinforced concrete pipes, or reinforced concrete box culverts. The capacity of a culvert crossing may be increased to reduce the risk of flooding to the surrounding area, or the culvert may be modified to prevent overtopping or erosion of the crossing. Typical measures include:

- Increasing the size of a culvert or adding culvert barrels;
- Replacing or changing the type of culvert;
- Changing the location or alignment of a culvert; and
- Adding features, such as a headwall, discharge apron, or riprap to reduce the risk of erosion or damage to a culvert or the crossing.

Similarly, bridges may be modified to increase capacity to reduce the risk of flooding or to reduce the risk of damage to the crossing. Typical activities include:

- Widening existing openings or constructing new openings;
- Reconfiguring bracing to reduce the risk that debris will be trapped;
- Installing protective features, such as concrete abutments or riprap, to reduce the risk of damage due to erosion and scour; and
- Replacing a multi-span structure with a clear-span structure.

A bridge may be installed to replace a culvert to increase the flow capacity of a crossing. Low-water crossings may be installed or improved as an alternative to repairing or replacing a culvert or bridge. Constructing or upgrading a low-water crossing typically involves hardening the banks and bottom of a water body. A temporary diversion may be necessary during construction activities.

Constructing and Water Detention, Retention, Storage or Conveyance Facility

Constructing a water detention, retention, storage, or conveyance facility may include the construction, enlargement, or restoration of detention basins, retention basins, sediment ponds, reservoirs, or conveyance facilities, such as irrigation ditches or flumes, to reduce flood flows or to provide a water source for fighting fires in an area of high fire hazard. The creation and/or enlargement of water storage reservoirs is most frequently associated with flood disasters and to a lesser extent, fire disasters.

Detention basins, retention basins, sediment ponds, and reservoirs will be constructed to temporarily store floodwater to reduce downstream peak flows. The stored water will be released at a slower rate so that the existing drainage-ways can convey water without contributing to downstream flooding. All areas disturbed during the construction of these features will be revegetated with native plant species. This action also will include the repair or restoration of water retention or conveyance structures. All sediment removed from these features will be disposed of in a manner consistent with Federal, State, and local laws and regulations.

In rural areas, firefighting may be constrained by the lack of water readily accessible to firefighters. In response to this need, proposed activities also may include the creation of retention facilities in locations that firefighters can readily access, either as a direct source of water or as a source of water to fill water supply trucks. All areas disturbed during the construction of a retention facility will be revegetated with native plant species.

Constructing Other Flood-Control Structures

A flood-control structure is a facility designed to prevent floodwaters from entering a flood-prone area. Typical examples are levees (also referred to as dikes) and floodwalls. Activities include:

- Repairing damaged facilities, usually during emergency situations;
- Installing embankment protection;
- Raising the height of existing facilities to prevent overtopping in future floods;
- Constructing new facilities to protect flood-prone areas from damage during future floods; and
- Modifying or installing interior drainage systems to reduce the risk of damage behind levees and floodwalls during heavy rains or flooding events on tributary streams.

Levees will be repaired or constructed using compacted fill and, in some cases, riprap protection. Bare earth will be seeded with grasses to prevent erosion. Typically, a gravel road will be installed on the levee's crest to allow for maintenance. Floodwalls, typically built in urban areas, will be constructed using reinforced concrete or grouted, reinforced concrete block. Excavation will be necessary to install footings. Levees and floodwalls both will have interior drainage systems that may include pumps for removing accumulated water.

Constructing a Coastal Feature

Constructing a coastal feature may involve the repair, replacement, or construction of facilities in coastal environments, such as estuaries, inlets, harbors, and beaches. These facilities include:

- Recreational facilities, such as piers and boat ramps;
- Facilities for maritime use, such as docks and slips;
- Shoreline protection devices, such as seawalls, groins, jetties, and revetments; and
- Coastal flood-control structures, such as levees.

Construction activities are expected to occur in water and involve driving piles, placing rock or soil, or dredging sand, mud, or other sediment.

<u>Wildfire Risk Reduction</u>

Vegetation management is intended to reduce the risk of loss and damage due to wildfire and, as described above under "Actions Involving Watercourses and Coastal Features", increase the ability of channels to convey flows, thus reducing the risk of flood damage. Vegetation management for wildfire risk reduction may be accomplished using mechanical means, hand-clearing, application of herbicides, or grazing. Some activities may include a combination of these methods. During implementation, avoidance and minimization measures will be used and incorporated as part of the action.

Relevant categories of activities are:

- Mechanical or hand clearing of vegetation;
- Herbicidal treatments; and
- Biological control.

Mechanical or Hand Clearing of Vegetation

Mechanical or hand clearing of vegetation will be used for the selective removal of vegetation so that a certain proportion of vegetation is left in place. This is done to reduce the amount of vegetative fuels in an area where mechanical removal of vegetation is impractical or the remaining vegetation needs to be protected. Per FEMA's Wildfire Mitigation Policy vegetation may be removed to create defensible space around buildings and structures, and to protect life and property beyond defensible space perimeters but proximate to (less than 2 miles from) at-risk structures. The creation and maintenance of firebreaks, access roads, and staging areas are not eligible for FEMA funding.

In mechanical removal, heavy equipment will be used to uproot, crush, pulverize, or cut the trees and brush being removed. Hand removal will involve the use of chainsaws, axes, and hoes to cut and uproot vegetation. Depending on the location of the vegetation removal project and State and local regulations, vegetation downed as a result of mechanical or hand removal will be piled and burned onsite, chipped and spread onsite, or loaded and hauled away from the site. After the removal of the targeted vegetation, cleared areas may be revegetated with native, fire-resistant species. Vegetation hauled offsite can be recycled but must be disposed of in accordance with appropriate requirements.

Herbicidal Treatments

Activities generally associated with herbicidal treatment include the removal of targeted exotic invasive species within specific areas and the prevention of growth and re-sprouting of undesirable vegetation once an area has been cleared of excessive vegetation by mechanical removal and/or hand removal. Only U.S. Environmental Protection Agency-approved herbicides will be used to control the growth of undesired vegetation in a manner consistent with labeling instructions and applicable Federal and State regulations. After treatment, some areas may be revegetated with native vegetation that is fire resistant.

Biological Control

In biological control, cattle, horses, goats, sheep, or other livestock are allowed to graze on grasses and other vegetation as a means of control. Any area proposed for grazing will be fenced. The type of animals, timing, duration, and stocking rate will be selected based on the targets of the vegetation management plan (i.e., the quantity and quality of residue to remain).

Proposed General Avoidance and Minimization Measures and Species-Specific Conservation Measures

General Avoidance and Minimization Measures

The general avoidance and minimization measures described in this section will be implemented, as appropriate, to reduce the identified potential adverse effects from a Subapplicant's proposed

project. The Subapplicant will be responsible for implementation of the avoidance and minimization measures that FEMA identifies as necessary for the proposed project.

GEN AMM-1 Erosion and Sedimentation Prevention Measures: The Subapplicant will prepare an Erosion Control Plan, as needed. The Erosion Control Plan will detail the erosion and sedimentation prevention measures required. As part of this plan, the Subapplicant will ensure that sediment-control devices are installed and maintained correctly. For example, sediment will be removed from engineering controls once the sediment has reached one-third of the exposed height of the control. The devices will be inspected frequently (i.e., daily or weekly, as necessary) to ensure that they are functioning properly; controls will be immediately repaired or replaced or additional controls will be installed as necessary. Sediment that is captured in these controls may be disposed of onsite in an appropriate, safe, approved area or offsite at an approved disposal site.

Areas of soil disturbance, including temporarily disturbed areas, will be seeded with a regionally appropriate erosion control seed mixture. On soil slopes with an angle greater than 30 percent, erosion control blankets will be installed or a suitable and approved binding agent will be applied. Runoff will be diverted away from steep or denuded slopes.

Where habitat for covered species is identified within, or adjacent to, the project footprint, all disturbed soils at the site will undergo erosion control treatment before the rainy season starts and after construction is terminated. Treatment may include temporary seeding and sterile straw mulch.

GEN AMM-2 Bank Stabilization: If bank stabilization activities are necessary, then such stabilization will be constructed to minimize erosion potential, and will contain design elements suitable for supporting riparian vegetation, if feasible.

GEN AMM-3 Dust Control Measures: To reduce dust, all traffic associated with the Subapplicant's construction activities will be restricted to a speed limit of 15 miles per hour when traveling off of highways or county roads.

Stockpiles of material that are susceptible to wind-blown dispersal will be covered with plastic sheeting or other suitable material to prevent movement of the material.

During construction, water or other binding materials will be applied to disturbed ground that may become windborne. If binding agents are used, all manufacturers' recommendations for use will be followed.

GEN AMM-4 Spill Control Planning: The Subapplicant will prepare a Spill Prevention and Pollution Control Plan to address the storage of hazardous materials and emergency cleanup of any hazardous material and will be available onsite, if applicable. The plan will incorporate hazardous waste, storm water, and other emergency planning requirements.

GEN AMM-5 Spill Prevention and Pollution Control Measures: The Subapplicant will exercise every reasonable precaution to protect covered species and their habitats from pollution due to fuels, oils, lubricants, construction by-products, and pollutants such as construction chemicals, fresh cement, saw-water, or other harmful materials. Water containing mud, silt, concrete, or other by-products or pollutants from construction activities will be treated by filtration, retention in a settling pond, or similar measures. Fresh cement or concrete will not be allowed to enter the flowing water of streams and curing concrete will not come into direct contact with waters supporting covered

species. Construction pollutants will be collected and transported to an authorized disposal area, as appropriate, per all Federal, State, and local laws and regulations.

To reduce bottom substrate disturbance and excessive turbidity, removal of existing piles by cutting at the substrate surface or reverse pile driving with a sand collar at the base to minimize resuspension of any toxic substances is preferable; hydraulic jetting will not be used.

No petroleum product chemicals, silt, fine soils, or any substance or material deleterious to covered species will be allowed to pass into or be placed where it can pass into a stream channel. There will be no side-casting of material into any waterway.

All concrete or other similar rubble will be free of trash and reinforcement steel. No petroleum-based products (e.g., asphalt) will be used as a stabilizing material.

The Subapplicant will store all hazardous materials in properly designated containers in a storage area with an impermeable membrane between the ground and the hazardous materials. The storage area will be encircled by a berm to prevent the discharge of pollutants to ground water or runoff into the habitats of covered species. A plan for the emergency cleanup of any hazardous material will be available onsite, and adequate materials for spill cleanup will be maintained onsite.

GEN AMM-6 Equipment Inspection and Maintenance: Well-maintained equipment will be used to perform the work and, except in the case of a failure or breakdown, equipment maintenance will be performed offsite. Equipment will be inspected daily by the operator for leaks or spills. If leaks or spills are encountered, the source of the leak will be identified, leaked material will be cleaned up, and the cleaning materials will be collected and properly disposed. Fueling of land- and marine-based equipment will be conducted in accordance with procedures to be developed in the Spill Prevention and Pollution Control Plan.

Vehicles and equipment that are used during the course of a project will be fueled and serviced in a "safe" area (i.e., outside of sensitive habitats) in a manner that will not affect covered species or their habitats. Spills, leaks, and other problems of a similar nature will be resolved immediately to prevent unnecessary effects on covered species and their habitats. A plan for the emergency cleanup of any spills of fuel or other material will be available onsite, and adequate materials for spill cleanup will be maintained onsite.

GEN AMM-7 Fueling Activities: Avoidance and minimization measures will be applied to protect covered species and their habitats from pollution due to fuels, oils, lubricants, and other harmful materials. Vehicles and equipment that are used during project implementation will be fueled and serviced in a manner that will not affect covered species or their habitats. Machinery and equipment used during work will be serviced, fueled, and maintained on uplands to prevent contamination to surface waters. Fueling equipment and vehicles will be kept more than 200 feet away from waters of the United States. Exceptions to this distance requirement may be allowed for large cranes, pile drivers, and drill rigs if they cannot be easily moved.

GEN AMM-8 Equipment Staging: No staging of construction materials, equipment, tools, buildings, trailers, or restroom facilities will occur in a floodplain during flood season at the proposed project location, even if staging is only temporary.

GEN AMM-9 Materials Storage and Disposal: Stockpiled soils will be adequately covered to prevent sedimentation from runoff and wind. All hazardous materials will be stored in upland areas

in storage trailers and/or shipping containers designed to provide adequate containment. Short-term laydown of hazardous materials for immediate use will be permitted provided the same containment precautions are taken as described for hazardous materials storage. All construction materials, wastes, debris, sediment, rubbish, trash, and fencing will be removed from the site once project construction is complete and transported to an authorized disposal area, as appropriate, in compliance with applicable Federal, State, and local laws and regulations. No disposal of construction materials or debris will occur in a floodplain. No storage of construction materials or debris will occur in a floodplain during flood season.

GEN AMM-10 Fire Prevention: With the exception of vegetation-clearing equipment, no vehicles or construction equipment will be operated in areas of tall, dry vegetation.

The Subapplicant will develop and implement a fire prevention and suppression plan for all maintenance and repair activities that require welding or otherwise have a risk of starting a wildfire.

GEN AMM-11 Waste Management: The work area will be kept free of loose trash, including small pieces of residual construction material, such as metal cuttings, broken glass, and hardware.

All food waste will be removed from the site on a daily basis.

All construction material, wastes, debris, sediment, rubbish, vegetation, trash, and fencing will be removed from the site once the project is completed and will be transported to an authorized disposal area, as appropriate, per all Federal, State, and local laws and regulations.

GEN AMM-12 Work Involving Boats and Barges: For projects that involve in-water work for which boats and/or temporary floating work platforms are necessary, buoys will be installed so moored vessels will not beach on the shoreline, anchor lines will not drag, and moored vessels and buoys are not located within 25 feet of vegetated shallow waters. Temporary floating work platforms will not anchor or ground in fish spawning areas in freshwater or in eelgrass, kelp, or macro algae. To reduce the likelihood of introducing aquatic invasive species, vessels will use the State's Marine Invasive Species Program. Drip pans and other spill control measures will be used so that oil or fuel from barge-mounted equipment is properly contained.

GEN AMM-13 Work Area Designation to Minimize Disturbance: The Subapplicant will reduce, to the maximum extent practicable, the amount of disturbance at a site to the absolute minimum necessary to accomplish the project. Wherever possible, existing vegetation will be salvaged from the project area and stored for replanting after earthmoving activities are completed. Topsoil will be removed, stockpiled, covered, and encircled with silt fencing to prevent loss or movement of the soil into covered species habitats. All topsoil will be replaced in a manner to recreate pre-disturbance conditions as closely as possible.

Project planning must consider not only the effects of the action itself, but also all ancillary activities associated with the actions, such as equipment staging and refueling areas, topsoil or spoils stockpiling areas, material storage areas, disposal sites, routes of ingress and egress to the project site, and all other related activities necessary to complete the project.

GEN AMM-14 Access Routes and Staging Areas: When working on stream banks or floodplains, disturbance to existing grades and vegetation will be limited to the actual site of the project and necessary access routes. Placement of all roads, staging areas, and other facilities will avoid and limit disturbance to sensitive habitats (e.g., stream banks, stream channel, and riparian

habitat) as much as possible. When possible, existing ingress or egress points will be used and/or work will be performed from the top of the stream banks. After completion of the work, the contours of the streambed, vegetation, and stream flows will be returned to their pre-construction condition or better.

All staging and material storage areas, including the locations where equipment and vehicles are parked overnight, will be placed outside of the flood zone of a watercourse, above areas of tidal inundation, away from riparian habitat or wetland habitat, and away from any other sensitive habitats. When possible, staging and access areas will be situated in areas that are previously disturbed, such as developed areas, paved areas, parking lots, areas with bare ground or gravel, and areas clear of vegetation.

GEN AMM-15 Environmental Awareness Training for Construction Personnel: All construction personnel will be given environmental awareness training by the project's environmental inspector or biological monitor before the start of construction. The training will familiarize all construction personnel with the covered species that may occur onsite, their habitats, general provisions and protections afforded by the Act, measures to be implemented to protect these species, and the project boundaries. This training will be provided within three days of the arrival of any new worker.

As part of the environmental awareness training, construction personnel will be notified that no dogs or any other pets under control of construction personnel will be allowed in the construction area, and that no firearms will be permitted in the construction area, unless carried by authorized security personnel or law enforcement.

GEN AMM-16 Biological Monitor: If a project involves activities that may result in take of a covered species, as defined by the Act, a Service-approved biologist will be present onsite for all construction activities that occur within 100 feet of habitat for those species. If a Service-approved biologist is needed, the Subapplicant will submit the biologist's qualifications to the Service for approval 30 days prior to project construction. The Service-approved biologist will ensure that all applicable avoidance and minimization measures in the programmatic biological opinion are implemented during project construction. The Service-approved biologist will also ensure that all vehicles entering the site are free of debris that may harbor organisms that could be introduced to the site, such as vegetation or mud from other aquatic areas. The Service-approved biologist will also ensure that turbidity, sedimentation, and the release of materials such as dust or construction runoff are controlled, and that spill control measures are enacted properly.

The Service-approved biologist will oversee construction activities to ensure that no covered species and/or their habitats are adversely affected. The Service-approved biologist will have the authority to stop any work activities that may result in potential adverse effects to covered species and/or their habitats.

Approval requests from the Subapplicants for Service-approved biologists shall include, at a minimum:

a. Relevant education;
b. Relevant training concerning the listed species for which approval is requested, including species identification, survey techniques, handling individuals of different age classes, and handling of different life stages by a permitted biologist or recognized species expert authorized by the Service for such activities;

c. A summary of field experience conducting requested activities (to include project/research information);
d. A summary of biological opinions under which they were authorized to work with the requested species and at what level (such as construction monitoring versus handling), this will also include the names and qualification of persons under which the work was supervised as well as the amount of work experience on the actual project;
e. A list of Federal Recovery Permits [10(a)1(A)] held or under which they are authorized to work with the species requested (to include the permit number, authorized activities and name of permit holder); and
f. Any relevant professional references with contact information.

GEN AMM-17 Daily Work Hours: Construction activities that may affect suitable habitat for covered species will be limited to daylight hours during weekdays, leaving a nighttime and weekend period for the species. Work will be allowed on weekends if the proposed construction is 14 days or less in length.

GEN AMM-18 Entrapment Prevention: To prevent entrapment of covered species, all vertically sided holes or trenches will be covered at the end of the workday, or have escape ramps built into the walls of the excavation. If pipes are stored onsite or in associated staging areas, they will be capped when not in use.

Construction materials that have the potential to entangle or entrap wildlife will be properly contained so that wildlife cannot interact with the materials.

If a covered species is identified onsite, crews will immediately stop work within 50 feet of the individual, and inform the construction supervisor and the Service-approved biologist. Work will not continue within 50 feet of the individual until it has traveled off the project site of its own volition. For covered species, please refer to the species-specific Conservation Measures section of the programmatic biological opinion.

GEN AMM-19 Water Quality Protection: Contractors will exercise every reasonable precaution to protect covered species and their critical habitats from construction byproducts and pollutants, such as construction chemicals, fresh cement, saw-water, or other deleterious materials. Fresh cement or uncured concrete will not be allowed to come into contact with any waterway. Construction waste will be collected and transported to an authorized upland disposal area, as appropriate, and per Federal, State, and local laws and regulations.

The Subapplicant will follow the best management practices described in *The Use of Treated Wood Products in Aquatic Environments* guidelines (NOAA Fisheries 2009). Although this guidance focuses on the effects of the contaminants on Pacific salmonids protected under the Act, this guidance may still apply for general water quality protection and other federally-protected species. This guidance will be used in conjunction with site-specific evaluations of other potential impacts. Riprap will be clean and durable, free from dirt, sand, clay, and rock fines and will be installed to withstand the 100-year flood event. If applicable, appropriate measures will be taken to minimize disturbance to potentially contaminated sediments.

GEN AMM-20 Revegetation of Stream Banks: For projects that require revegetation of stream and riverbanks as a result of riparian vegetation removal during construction activities, the Subapplicant will implement revegetation techniques. Where such revegetation is needed, the Subapplicant will prepare and implement a revegetation plan that includes information regarding

monitoring for success. Revegetation plantings will be replaced at a 3:1 ratio with an 80 percent planting survival within 5 years of the plantings.

GEN AMM-21 Restoration of Upland Areas to Pre-Project Conditions: For projects that require restoration of upland areas to pre-project conditions as a result of ground disturbance during construction activities, the Subapplicant will use native plants to the maximum extent practicable. Similarly, when hydroseeding, only native seed mix will be used.

GEN AMM-22 Invasive Aquatic Species: The Subapplicant will follow the guidelines in the California Department of Fish and Wildlife's (CDFW's) *California Aquatic Invasive Species Management Plan* to prevent the spread of invasive aquatic plant and animal species (CDFW 2008).

Construction equipment will be clean of debris or material that may harbor seeds or invasive pests before entering the work area. This debris or material includes dirt on construction equipment, tools, boots, pieces of vegetation, and water in the bilge of boats. All aquatic sampling equipment will be sterilized using appropriate guidelines before its use in aquatic habitats.

GEN AMM-23 Work below Mean Higher High Water: In freshwater, estuarine, and marine areas that support covered species, disturbance to habitat below mean higher high water will be limited to the maximum extent possible.

GEN AMM-24 Avoidance of Submerged Vegetation: The removal of submerged vegetation (such as eelgrass and kelp estuarine or marine areas, or submerged aquatic vegetation in freshwater areas) will be avoided to the maximum extent possible.

GEN AMM-25 Minimization of Shading by Overwater Structures: To reduce shading effects, new and replacement structures placed over freshwater, estuarine, and marine waters (such as bridges, piers, floating docks, and gangways) will incorporate design elements (such as metal grating or glass paver blocks) that allow light transmission when feasible.

GEN AMM-26 Water Diversion and Dewatering: In-channel work and channel diversion of live flow during project construction will be conducted in a manner to reduce impacts to covered species. Dewatering will be used to create a dry work area and will be conducted in a manner that minimizes turbidity into nearby waters. Water diversion and dewatering will include the following measures:

a. Heavy equipment will avoid flowing water other than temporary crossing or diverting activities.
b. If covered species may be present in the areas to be dewatered, relocation will be conducted by a Service-approved biologist in accordance with applicable Service species-specific Conservation Measures. Because this measure involves take of a species, it is only applicable to covered species for which an Incidental Take Statement is provided.
c. Water pumped or removed from dewatered areas will be treated before its release so that it does not contribute to turbidity in nearby waters.
d. Temporary culverts to convey live flow during construction activities will be placed at stream grade and be of an adequate size as to not increase stream velocity.
e. Silt fences or mechanisms to avoid sediment input to the flowing channel will be erected adjacent to flowing water if sediment input to the stream may occur.

Species-Specific Conservation Measures

In cases where the species-specific Conservation Measures are duplicative of the General Avoidance and Minimization Measures, the most comprehensive measure (i.e., the measure providing the most restriction) will apply.

California Red-Legged Frog California Tiger Salamander, Central California DPS, California Tiger Salamander, Sonoma DPS

To reduce potential effects to the California red-legged frog and Sonoma and Central California tiger salamander Distinct Population Segments (DPSs) (California tiger salamander), the following measures to avoid and minimize adverse effects to the California red-legged frog and California tiger salamander and their critical habitat will be incorporated into the proposed project. These measures will be communicated to the contractor through the use of special provisions included in the contract bid solicitation package.

CRLF-CTS-1 Biological Monitor: A SFWO-approved biologist(s) will be onsite during all activities that may result in take of California red-legged frogs or California tiger salamanders.

CRLF-CTS-2 Seasonal Avoidance: Project activities will be scheduled to minimize adverse effects to the California red-legged frog and California tiger salamander and their habitat. Disturbance to upland habitat will be confined to the dry season, generally May 1 through October 15 (or the first measurable fall rain of 1" or greater) because that is the time period when California red-legged frogs and California tiger salamanders are less likely to be moving through upland areas. However, if unavoidable, conduct grading and other disturbance in pools and ponds only when they are dry, typically between July 15 and October 15. Work within a pool or wetland may begin prior to July 15 if the pool or wetland has been dry for a minimum of 30 days prior to initiating work.

CRLF-CTS-3 Rain Event Limitations: To the maximum extent practicable, no construction activities will occur during rain events or within 24 hours following a rain event. Prior to construction activities resuming, a SFWO-approved biologist will inspect the Action Area and all equipment/materials for the presence of California red-legged frogs and California tiger salamanders. Construction may continue 24 hours after the rain ceases if no precipitation is forecasted within 24-hours. If rain exceeds 0.5 inches during a 24-hour period, work will cease until no further rain is forecasted. The Service may approve modifications to this timing on a case-by-case basis.

CRLF-CTS-4 Pre-construction Survey: No more than 24 hours prior to the date of initial ground disturbance and vegetation clearing, a SFWO-approved biologist with experience in the identification of all life stages of the California red-legged frog and California tiger salamander and designated critical habitat will conduct a pre-construction survey at the project site. The survey will consist of walking the project limits and within the project site to determine possible presence of the species. The SFWO-approved biologist will investigate all areas that could be used by California red-legged frogs and California tiger salamanders for feeding, breeding, sheltering, movement, and other essential behaviors, such as small woody debris, refuse, burrows entries, etc.

CRLF-CTS-5 Daily Clearance Surveys: The SFWO-approved biologist will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of California red-legged frogs and California tiger salamanders.

CRLF-CTS-6 Environmentally Sensitive Areas: Prior to the start of construction, Environmentally Sensitive Areas (ESAs) – defined as areas containing sensitive habitats adjacent to or within construction work areas for which physical disturbance is not allowed – will be clearly delineated using high visibility orange fencing. The ESA fencing will remain in place throughout the duration of the proposed action, while construction activities are ongoing, and will be regularly inspected and fully maintained at all times. The final project plans will depict all locations where ESA fencing will be installed and will provide installation specifications. The bid solicitation package special provisions will clearly describe acceptable fencing material and prohibited construction-related activities including vehicle operation, material and equipment storage, access roads and other surface-disturbing activities within ESAs. With prior approval from the Service, a hybrid ESA/WEF fencing material that is both hi-visibility and impermeable to wildlife movement may be used in place of paired ESA fencing and WEF fencing. Also with prior approval from the Service, an exception to the foregoing fencing measures may apply on a case-by-case basis during the following situations: (1) at work sites where the duration of work activities is very short (e.g., 3 days or less), the work activities occur during the dry season, and the installation of ESA fencing will result in more ground disturbance than from project activities; or (2) at work sites where the substrate (i.e., rock, shale, etc.) or topography (i.e., slopes > 30 degrees) inhibit the safe and proper installation of fencing materials. In these cases, biological monitoring will occur during all project activities at that site.

CRLF-CTS-7 Wildlife Exclusion Fencing: Prior to the start of construction, Wildlife Exclusion Fencing (WEF) will be installed at the edge of the project footprint in all areas where California red-legged frogs and California tiger salamanders could enter the construction area. The onsite Project Manager and the SFWO-approved biologist will determine location of the fencing prior to the start of staging or surface disturbing activities.

a. Exclusion fencing will be at least 3 feet high and the lower 6 inches of the fence will be buried in the ground to prevent animals from crawling under. The remaining 2.5 feet will be left above ground to serve as a barrier for animals moving on the ground surface.
b. Such fencing will be inspected and maintained daily by the SFWO-approved biologist until completion of the project and removed only when all construction equipment is removed from the site.
c. The WEF specifications will be included the final project plans and in the bid solicitation package (special provisions) and will include the WEF specifications including installation and maintenance criteria.
d. The WEF will remain in place throughout the duration of the project and will be regularly inspected and fully maintained. Repairs to the WEF will be made within 24 hours of discovery.
e. Upon project completion the WEF will be completely removed, the area cleared of debris and trash, and returned to natural conditions.
f. With prior approval from the Service, an exception to the foregoing fencing measures may apply on a case-by-case basis during the following situations: 1) at work sites where the duration of work activities are very short (e.g., 3 days or less), the work activities occur during the dry season, and the installation of exclusion fencing will result in more ground disturbance than from project activities; or (2) at work sites where the substrate (i.e., rock, shale, etc.) or topography (i.e., slopes > 30 degrees) inhibit the safe and proper installation of fencing materials. In these cases, species monitoring will occur during all project activities at that site. Modifications to this fencing measure may be made on a case-by-case basis with approval from the Service.

g. With prior approval from the Service, a hybrid ESA/WEF fencing material that is both hi-visibility and impermeable to wildlife movement may be used in place of paired ESA fencing and WEF fencing.

CRLF-CTS-8 Entrapment Prevention: To prevent inadvertent entrapment of animals during construction, all excavated, steep-walled holes or trenches more than 6 inches deep will be covered with plywood or similar materials at the close of each working day or provided with one or more escape ramps constructed of earth fill or wooden planks. The SFWO-approved biologist will inspect all holes and trenches at the beginning of each workday and before such holes or trenches are filled. All replacement pipes, culverts, or similar structures stored in the Action Area overnight will be inspected before they are subsequently moved, capped, and/or buried. If at any time a California red-legged frog or California tiger salamander is discovered, the onsite Project Manager and SFWO-approved biologist will be notified immediately and the SFWO-approved biologist will implement the species observation and handling protocol. If handling is necessary, work will be suspended until the appropriate level of coordination is complete.

CRLF-CTS-9 Encounters with Species: Each encounter with a California red-legged frog or California tiger salamander will be treated on a case-by-case basis. If any life stage of the California red-legged frog or California tiger salamander is found and these individuals may be killed or injured by work activities, the following will apply:

a. If California red-legged frogs or California tiger salamanders are detected in the Action Area, work activities within 50 feet of the individual that may result in the harm, injury, or death to the animal will cease immediately and the onsite Project Manager and SFWO-approved biologist will be notified. Based on the professional judgment of the SFWO-approved biologist, if project activities can be conducted without harming or injuring the California red-legged frog and California tiger salamander, it may be left at the location of discovery and monitored by the SFWO-approved biologist. All project personnel will be notified of the finding and at no time will work occur within 50 feet of a California red-legged frog and California tiger salamander without a SFWO-approved biologist present.
b. To the maximum extent possible, contact with the individual frog or salamander will be avoided and it will be allowed to move out of the hazardous situation of its own volition. This procedure applies to situations where a California red-legged frog and California tiger salamander is encountered while it is moving to another location. It does not apply to animals that are uncovered or otherwise exposed or in areas where there is not sufficient adjacent habitat to support the species if the individual moves away from the hazardous location.

CRLF-CTS-10 Species Observations and Handling Protocol: If a California red-legged frog or California tiger salamander does not leave the work area, the SFWO-approved biologist will implement the species observation and handling protocol outlined below. Only SFWO-approved biologists will participate in activities associated with the capture, handling, relocation, and monitoring of California red-legged frogs and California tiger salamanders.

a. Prior to handling and relocation, the SFWO-approved biologist will take precautions to prevent introduction of amphibian diseases in accordance with the Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander (Service 2003c). Disinfecting equipment and clothing is especially important when biologists are coming to the Action Area to handle amphibians after working in other aquatic habitats. California red-legged frogs and the Sonoma and

Central California tiger salamanders will also be handled and assessed according to the Restraint and Handling of Live Amphibians (USGS National Wildlife Health Center 2001).

b. California red-legged frogs and California tiger salamanders will be captured by hand, dip net, or other SFWO-approved methodology, transported and relocated to nearby suitable habitat outside of the work area and released as soon as practicable the same day of capture. Individuals will be relocated no greater than 300 feet outside of the project site to areas with an active rodent burrow or burrow system (unless otherwise approved by the Service and with written landowner permission). Holding/transporting containers and dip nets will be thoroughly cleaned, disinfected, and rinsed with freshwater prior to use within the Action Area. The Service will be notified within 24 hours of all capture, handling, and relocation efforts.

c. If an injured California red-legged frog or California tiger salamander is encountered and the SFWO-approved biologist determines the injury is minor or healing and the salamander is likely to survive, the salamander will be released immediately, consistent with measure 12.b above. The California red-legged frogs and the Sonoma and Central California tiger salamander will be monitored until it is determined that it is not imperiled by predators or other dangers.

d. If the SFWO-approved biologist determines that a California red-legged frog or California tiger salamander has major or serious injuries as a result of project-related activities the SFWO-approved biologist, or designee, will immediately take it to a SFWO-approved facility. If taken into captivity the individual will remain in captivity and not be released into the wild unless it has been kept in quarantine and the release is authorized by the Service. The Subapplicant will bear any costs associated with the care or treatment of such injured California red-legged frogs or California tiger salamanders. The circumstances of the injury, the procedure followed and the final disposition of the injured animal will be documented in a written incident report to the Service as described below.

e. Notification to the Service of an injured or dead California red-legged frog or California tiger salamander in the Action Area will be made and reported whether or not its condition resulted from project-related activities. In addition, the SFWO-approved biologist will follow up with the Service in writing within 2 calendar days of the finding. Written notification to the Service will include the following information: the species, number of animals taken or injured, sex (if known), date, time, location of the incident or of the finding of a dead or injured animal, how the individual was taken, photographs of the specific animal, the names of the persons who observe the take and/or found the animal, and any other pertinent information. Dead specimens will be preserved, as appropriate, and will be bagged and labeled (i.e. species type; who found or reported the incident; when the report was made; when and where the incident occurred; and if possible, the cause of death). Specimens will be held in a secure location until instructions are received from the Service regarding the disposition of the specimen.

CRLF-CTS-11 Environmental Awareness Training: Prior to the start of construction, a SFWO-approved biologist with experience in the ecology of the California red-legged frog and California tiger salamander as well as the identification of all its life stages will conduct a training program for all construction personnel including contractors and subcontractors. Interpretation for non-English speaking workers will be provided. All construction personnel will be provided a fact sheet conveying this information. The same instruction will be provided to any new workers before they are authorized to perform project work. The training will include, at a minimum:

a. habitat within the Action Area;
b. an explanation of the species status and protection under state and federal laws;

c. the avoidance and minimization measures to be implemented to reduce take of this species;
d. communication and work stoppage procedures in case a listed species is observed within the Action Area; and
e. an explanation of the importance of the Environmentally Sensitive Areas (ESAs) and Wildlife Exclusion Fencing (WEF).

CRLF-CTS-12 Disease Prevention and Decontamination Procedures: To ensure that diseases are not conveyed between work sites by the SFWO-approved biologist, the fieldwork code of practice developed by the Declining Amphibian Populations Task Force will be followed at all times. A copy of the code of practice is enclosed.

CRLF-CTS-13 Pump Screens: If a water body is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than 5 millimeters and the intake will be placed within a perforated bucket or other method to attenuate suction to prevent California red-legged frogs and California tiger salamanders from entering the pump system. Pumped water will be managed in a manner that does not degrade water quality and upon completion be released back into the water body, or at an appropriate location in a manner that does not cause erosion. No re-watering of the water body is necessary if sufficient surface or subsurface flow exists to fill it within a few days, or if work is completed during the time of year the water body will have dried naturally. To avoid effects to eggs and larvae, work within seasonal ponds will be conducted when the pond has been dry naturally for at least 30 days

CRLF-CTS-14 Hand Clear Vegetation: Hand clear vegetation in areas where California red-legged frogs and California tiger salamanders are suspected to occur. All cleared vegetation will be removed from the project footprint to prevent attracting animals to the project site. A SFWO-approved biologist will be present during all vegetation clearing and grubbing activities. Prior to vegetation removal, the SFWO-approved biologist will thoroughly survey the area for California red-legged frogs and California tiger salamanders. Once the SFWO-approved biologist has thoroughly surveyed the area, clearing and grubbing may continue without further restrictions on equipment; however, the SFWO-approved biologist will remain onsite to monitor for California red-legged frogs and California tiger salamanders until all clearing and grubbing activities are complete.

CRLF-CTS-15 Wildlife Passage for Road Improvement: When constructing a road improvement, wherever possible, enhance or establish wildlife passage for the California red-legged frog and California tiger salamander across roads, highways, or other anthropogenic barriers. This includes upland culverts, tunnels, and other crossings designed specifically for wildlife movement, as well as making accommodations in curbs, median barriers, and other impediments to terrestrial wildlife movement at locations most likely beneficial to the California red-legged frog and California tiger salamander.

CRLF-CTS-16 Accidental Spills, SWPPP, Erosion Control, and BMPs: Prior to the onset of work, a plan will be in place for prompt and effective response to any accidental spills. All workers will be informed of the importance of preventing spills and of the appropriate measures to implement if a spill occurs. Storm-water pollution prevention plans and erosion control BMPs will be developed and implemented to minimize any wind- or water-related erosion. These provisions will be included in construction contracts for measures to protect sensitive areas and prevent and minimize storm-water and non-storm-water discharges. Protective measures will include, at a minimum:

a. No discharge of pollutants from vehicle and equipment cleaning is allowed into any storm drains or watercourses.
b. Vehicle and equipment fueling and maintenance operations must be at least 50 feet away from aquatic or riparian habitat and not in a location where a spill may drain directly toward aquatic habitat, except at established commercial gas stations or at an established vehicle maintenance facility. The monitor will implement the spill response plan to ensure contamination of aquatic or riparian habitat does not occur during such operations.
c. Concrete wastes will be collected in washouts and water from curing operations is to be collected and disposed of properly. Neither will be allowed into watercourses.
d. Spill containment kits will be maintained onsite at all times during construction operations and/or staging or fueling of equipment.
e. Dust control will be implemented, and may include the use of water trucks and non-toxic tackifiers (binding agents) to control dust in excavation and fill areas, rocking temporary access road entrances and exits, and covering of temporary stockpiles when weather conditions require.
f. Graded areas will be protected from erosion using a combination of silt fences, fiber rolls, etc. along toes of slopes or along edges of designated staging areas, and erosion control netting (such as jute or coir) as appropriate on sloped areas. No erosion control materials that use plastic or synthetic monofilament netting will be used.
g. Permanent erosion control measures such as bio-filtration strips and swales to receive storm water discharges from paved roads or other impervious surfaces will be incorporated to the maximum extent practicable.
h. All grindings and asphaltic-concrete waste will be stored within previously disturbed areas absent of habitat and at a minimum of 50 feet from any aquatic habitat, culvert, or drainage feature.

CRLF-CTS-17 Site Restrictions: The following site restrictions will be implemented to avoid or minimize effects on the listed species and its habitat:

a. A speed limit of 15 miles per hour (mph) in the project footprint in unpaved areas will be enforced to reduce dust and excessive soil disturbance.
b. Construction and ground disturbance will occur only during daytime hours, and will cease no less than 30 minutes before sunset and may not begin again earlier than 30 minutes after sunrise.
c. Except when necessary for driver or pedestrian safety, to the maximum extent practicable, artificial lighting at a project site will be prohibited during the hours of darkness.
d. Routes and boundaries of roadwork will be clearly marked prior to initiating construction or grading.
e. To the maximum extent practicable, any borrow material will be certified to be non-toxic and weed free.
f. All food and food-related trash items will be enclosed in sealed trash containers and properly disposed of offsite.
g. No pets will be allowed anywhere in the Action Area during construction.

CRLF-CTS-18 Suitable Erosion Control Materials: To prevent California red-legged frogs and California tiger salamanders from becoming entangled, trapped, or injured, erosion control materials that use plastic or synthetic monofilament netting will not be used within the Action Area. This includes products that use photodegradable or biodegradable synthetic netting, which can take several months to decompose. Acceptable materials include natural fibers such as jute, coconut,

twine or other similar fibers. Following site restoration, erosion control materials, such as straw wattles, will not block movement of the California red-legged frog and California tiger salamander.

CRLF-CTS-19 Limitation on Insecticide/Herbicide Use: Insecticides or herbicides will not be applied at the project site during construction where there is the potential for these chemical agents to enter creeks, streams, waterbodies, or uplands that contain habitat for the California red-legged frog and California tiger salamander.

CRLF-CTS-20 Limitation on Rodenticide Use: No rodenticides will be used at the project site during construction or long-term operational maintenance in areas that support suitable upland habitat for the California red-legged frog and California tiger salamander.

CRLF-CTS-21 Invasive Non-Native Plant Species Prevention: The SFWO-approved biologist will ensure that the spread or introduction of invasive non-native plant species, via introduction by arriving vehicles, equipment, imported gravel, and other materials, will be avoided to the maximum extent possible. When practicable, invasive non-native plants in the Action Area will be removed and properly disposed of in a manner that will not promote their spread. Areas subject to invasive non-native weed removal or disturbance will be replanted with appropriate mix of fast-growing native species. Invasive non-native plant species include those identified in the California Invasive Plant Council's (Cal-IPC) Inventory Database, accessible at: www.cal-ipc.org/ip/inventory/index.php.

CRLF-CTS-22 Removal of Diversion and Barriers to Flow: Upon completion of construction activities, any diversions or barriers to flow will be removed in a manner that will allow flow to resume with the least disturbance to the substrate. Alteration of creek beds will be minimized to the maximum extent possible; any imported material will be removed from stream beds upon completion of the project.

CRLF-CTS-23 Removal of Non-Native Species: A SFWO-approved individual will permanently remove, from within the Action Area, any individuals of non-native species, such as bullfrogs, crayfish, and centrarchid fishes, to the maximum extent possible. The Subapplicant is responsible for ensuring that these activities are in compliance with the California Fish and Game Code. No conversion of seasonal breeding aquatic habitat to perennial aquatic breeding habitat is allowed under this programmatic biological opinion. Creating new perennial water bodies in the vicinity of California red-legged frog or California tiger salamander populations where the ponds could be colonized by predators will also be avoided. Larval mosquito abatement efforts will be avoided in occupied breeding habitat for the species.

CRLF-CTS-24 Restore Contours of Temporarily Disturbed Areas: Habitat contours will be returned to their original configuration at the end of project activities in all areas that have been temporarily disturbed by activities associated with the project, unless the Subapplicant and the Service determine that it is not feasible or modification of original contours will benefit the California red-legged frog and California tiger salamander.

CRLF-CTS-25 Use of Native Plants for Revegetation: Plants used in revegetation will consist of native riparian, wetland, and upland vegetation suitable for the area. Locally collected plant materials will be used to the extent practicable. This measure will be implemented in all areas disturbed by activities associated with the project, unless the Subapplicant and the Service determine that it is not feasible or practical.

CRLF-CTS-26 Practices to Prevent Pathogen Contamination in Revegetation and Restoration: The Subapplicant will refer to the following restoration design considerations and practices to help prevent pathogen contamination in revegetation and restoration as published by the Working Group for *Phytophthora* in Native Habitats in order to address the risk of introduction and spread of *Phytophthora* and other plant pathogens in site plantings:

a. Design restoration with lower initial plant density. Planting large quantities of nursery plants increases the likelihood that some of those plants may be infested with *Phytophthora* or other plant pathogens. The greater the number of plants installed the higher the risk for pathogen introduction. The closer the plants are to one another the higher the likelihood of pathogen spread.
b. To the extent possible, use direct seeding of native plant seeds or cuttings instead of container stock. Planting locally-collected seeds or cuttings rather than installing container stock can minimize the risk of introducing pathogens to a site.
c. Ensure the use of clean nursery stock. To prevent and manage the introduction and spread of *Phytophthora* and other plant pathogens during revegetation and restoration activities, it is essential that projects use clean nursery stock grown with comprehensive best management practices.
d. Prevent contamination in site preparation, installation, and maintenance. Implementing best management practices to prevent pathogen introduction and spread is also critical during all other phases of revegetation and restoration to reduce contamination risk. For detailed guidance on how to prevent and manage *Phytophthora* during various aspects of restoration, including nursery plant production, see The Phytophthora in Native Habitats Work Group "Restoration Guidance" at www.calphytos.org.
e. Reduce the potential for pathogen spread and introduction due to movement or use of non-sanitized vehicles, tools, footwear or inadvertent use of contaminated materials (e.g. soil erosion protection wattles and mulch, or non-sanitized materials recycled from other projects such as rebar, fencing materials, etc.). Fundamental principles include:
    i. Minimize project footprint and soil disturbance. Keep the number of vehicle pass-throughs and other disturbances during site activities to the least necessary. Avoid visits when conditions are wet, and areas are muddy. Park vehicles in designated staging areas.
    ii. Follow sanitation practices. *Phytophthora* and many other pathogens move when contaminated soil is transferred on vehicle tires, footwear, on contaminated tools or infested plant materials. Follow sanitation best management practices: tools, boots, and vehicles will be visibly free of soil before and after use.
    iii. Promote prevention through education. Ensure that onsite personnel are aware of the risk of inadvertent pathogen introductions and understand how to prevent pathogen introduction and spread. A pre-project meeting that provides appropriate BMP training to all workers and oversight managers who will be onsite during the project will help avoid confusion and delays in the field and will ensure in advance that everyone understands the project goals related to pathogen prevention.

Giant Garter Snake Conservation Measures

GGS-1 Seasonal Avoidance: To the extent practicable, confine construction activity within 200 feet of giant garter snake habitat to the period between May 1 and October 1. This is the active period for giant garter snake and direct mortality is lessened because snakes are expected to actively move and avoid danger.

GGS-2 Site Restrictions: Work activities will be restricted to existing roads and trails to the maximum extent possible. When existing roads and trails cannot be followed, and disturbance is giant garter snake habitat, vegetation will be removed by hand to prevent mortality associated with mowers and other landscaping equipment. Project-related vehicles will observe a 15-mph speed limit within construction areas and access roads (except on County road and state and federal highways). This is particularly important during the time period when the snake may be sunning or moving along roadways.

GGS-3 Clearance Surveys: Within 24 hours prior to the commencement of construction activities, the Action Area will be surveyed for giant garter snakes by a SFWO-approved biologist. The biologist will provide the Service with a written report (e-mail is acceptable) that adequately documents the pre-construction survey results within 24-hours of commencement of construction activities. The Action Area will be re-inspected by the SFWO-approved biologist whenever a lapse in construction activity of 2 weeks or greater has occurred. If a giant garter snake is encountered during surveys, cease activities until the SFWO-approved biologist has determined that the snake will not be harmed or the snake leaves the work area on its own.

GGS-4 Dewatering: Aquatic habitat for the snake will be dewatered, and then remain dry and absent of aquatic prey for 15 days prior to the initiation of construction activities. If complete dewatering is not possible, the Service will be contacted to determine what additional measures may be necessary to minimize effects to the snake.

GGS-5 Fencing: Prior to October 1st and after aquatic habitat has been dewatered, high visibility fencing will be erected along the edge of construction areas bordering suitable giant garter snake habitat to identify and protect these areas from encroachment of personnel and equipment. These areas will be avoided by all construction personnel. The fencing will be inspected by the Subapplicant before the start of each work day and maintained by the Subapplicant until completion of the project. Fencing will be established in the uplands immediately adjacent to aquatic snake habitat and extending up to 200 feet from construction activities. Snake exclusionary fencing will be buried at least six inches below the ground to prevent snakes from attempting to burrow or move under the fence. To prevent giant garter snake from becoming entangled, trapped, or injured, erosion control materials that use plastic or synthetic monofilament netting will not be used in the Action Area. Acceptable materials include natural fibers such as jute, coconut, twine or other similar fibers.

GGS-6 Contacting the Service: If construction activities in giant garter snake habitat are necessary between October 2 and April 30, the Service's SFWO will be contacted to determine whether additional measures are necessary to avoid and minimize take. Recommended measures will be implemented.

GGS-7 Biological Monitor: A SFWO-approved biologist will inspect and monitor all construction-related activities within the Action Area to attempt to minimize take of the snake or the destruction of its habitat. If snakes are encountered during construction activities, the biologist will notify the SFWO immediately to determine the appropriate procedures. A report will be submitted, including date(s), location(s), habitat description, and any corrective measures taken to protect the snake, within one (1) business day.

GGS-8 Reporting: The SFWO-approved biologist will be required to report any take of listed species to the SFWO immediately by a written letter addressed to the appropriate Service office within one (1) working day of the incident.

Alameda Whipsnake Conservation Measures

The Subapplicant will implement the following measures in Alameda whipsnake supporting habitat:

AWS-1 Environmental Awareness Training: Prior to construction, a SFWO-approved biologist with experience in the ecology and identification of the Alameda whipsnake will conduct an education program for all construction personnel, including contractors and subcontractors. Interpretation will be provided for non-English speaking workers. The same instruction will be provided to any new workers at the site before they are authorized to perform project work. Fact sheets conveying this information and color photographs of the species will be prepared for distribution to the above-mentioned people and anyone else who may enter the Action Area. The program will include, at a minimum:

a. a brief description of the species and their habitat needs;
b. any reports of occurrences in the Action Area;
c. an explanation of the species' status and protection under the Act;
d. communication and work stoppage procedures in case an individual is observed within the Action Area; and
e. a list of avoidance and minimization measures being taken to reduce effects to the species during construction and implementation.

AWS-2 Site Restrictions: The following site restrictions will be implemented to avoid or minimize effects on the Alameda whipsnake and its habitat:

a. A speed limit of 15 miles per hour (mph) in the project footprint in unpaved areas will be enforced to reduce dust and excessive soil disturbance.
b. Construction and ground disturbance will occur only during daytime hours, and will cease no less than 30 minutes before sunset and may not begin again earlier than 30 minutes after sunrise.
c. Routes and boundaries of roadwork will be clearly marked prior to initiating construction or grading.
d. To the maximum extent practicable, any borrow material will be certified to be non-toxic and weed free.
e. All food and food-related trash items will be enclosed in sealed trash containers and properly disposed of offsite.
f. No pets will be allowed anywhere in the Action Area during construction.

AWS-3 Biological Monitor: The SFWO-approved biologist will be onsite during initial ground-disturbing activities, and thereafter as needed to fulfill the role of the approved biologist as specified in project permits. The SFWO-approved biologist will keep copies of applicable permits in their possession when onsite. Through the Resident Engineer, Project Manager or their designee, the SFWO-approved biologist will have the authority to communicate either verbally, by telephone, e-mail or hardcopy with all project personnel to ensure that take of listed species is minimized and permit requirements are fully implemented. Through the Resident Engineer, Project Manager or their designee, the SFWO-approved biologist will have the authority to temporarily stop project activities to minimize take of listed species or if they determine that any permit requirements are not fully implemented. If the SFWO-approved biologist exercises this authority, the SFWO will be notified by telephone and e-mail within 24 hours.

AWS-4 Habitat Avoidance: During project implementation, avoid the following habitats for this species:

a. To the extent possible, all rock outcroppings will be avoided.
b. Ground disturbance and vegetation clearing in scrub/chaparral habitat will be avoided to the maximum extent possible. Where disturbance cannot be avoided in this habitat type, work will be limited to the fall season of September to November in order to allow the young of the year time to become sufficiently capable of escaping such activities.

AWS-5 Seasonal Avoidance: Construction activities will occur between June 15 - October 31, when Alameda whipsnakes are more active, capable of escaping, and less likely to be impacted.

AWS-6 Use Hand Operated Equipment: Work activities will be restricted to existing roads and trails to the maximum extent possible. When existing roads and trails cannot be followed, shrub vegetation will be removed by equipment operated by hand to prevent mortality associated with mowers or other large mechanical equipment. A SFWO-approved biologist experienced in identifying Alameda whipsnake will be present during vegetation removal.

AWS-7 Pre-construction Surveys: Pre-construction surveys for the Alameda whipsnake will be conducted by the SFWO-approved biologist no more than 20 calendar days prior to any initial ground disturbance within Alameda whipsnake habitat. These surveys will consist of walking the project limits and, if possible, any accessible adjacent areas within at least 50 feet of the project limits. The SFWO-approved biologist will investigate potential cover sites when it is feasible and safe to do so. This includes thorough investigation of mammal burrows, rocky outcrops, appropriately sized soil cracks, tree cavities, and debris.

AWS-8 Clearance Surveys: No more than 24 hours prior to the date of initial ground disturbance and vegetation clearing, a SFWO-approved biologist with experience in the identification of the Alameda whipsnake will conduct clearance surveys and monitoring within 50 feet of the project site. The SFWO-approved biologist will investigate all areas that could be used by Alameda whipsnakes for sheltering, movement, and other essential behaviors. This includes an adequate examination of rock outcroppings and mammal burrows. Safety permitting, the SFWO-approved biologist will investigate areas of disturbed soil for signs of the listed species within 30 minutes following the initial disturbance of that given area. The SFWO-approved biologist will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of Alameda whipsnake.

AWS-9 Entrapment Prevention: To prevent inadvertent entrapment of Alameda whipsnakes during construction excavated holes or trenches more than one foot deep with walls steeper than 30 degrees will be covered at the close of each working day by plywood or similar materials. Alternatively, an additional 4-foot high vertical barrier, independent of exclusionary fences, will be used to further prevent the inadvertent entrapment of listed species. If it is not feasible to cover an excavation or provide an additional 4-foot high vertical barrier, independent of exclusionary fences, one or more escape ramps constructed of earth fill or wooden planks will be installed. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals. If at any time a trapped Alameda whipsnake is discovered, the onsite biologist will immediately place escape ramps or other appropriate structures to allow the animal to escape or the Service will be contacted by telephone for guidance. The SFWO will be notified of the incident by telephone and e-mail within 24 hours.

AWS-10 Wildlife Exclusion Fencing: Prior to the start of construction in individual construction areas, wildlife exclusion fencing will be installed along the project footprint in all areas where the Alameda whipsnake could enter the active site. The location and extent of wildlife exclusion fencing will be presented to the SFWO for approval prior to project initiation. The Subapplicant will include the exclusion fencing specifications on the final project plans. The Subapplicant will include the exclusion fencing specifications, including installation and maintenance criteria, in the bid solicitation package special provisions. The fencing will remain in place throughout the duration of the construction activities within the individual work areas and will be regularly inspected and fully maintained. Repairs to the fence will be made within 24 hours of discovery. Upon completion of activities within the given area, the fence will be completely removed; the area cleaned of debris and trash, and returned to natural conditions.

AWS-11 Fencing: Prior to ground disturbance, active areas within the project footprint will be delineated with temporary, high-visibility fencing to prevent the encroachment of construction personnel and equipment outside the described project footprint. The fencing will be removed after all construction equipment is removed from those segments of the project.

AWS-12 Using Cover Boards: The SFWO-approved biologist will place cover boards in strategic locations throughout the project footprint during the pre-construction surveys. During construction, these cover boards will be checked on a daily basis for the Alameda whipsnake when the SFWO-approved biologist is onsite.

AWS-13 Reporting: The SFWO will be notified within one (1) working day if an Alameda whipsnake is discovered within the Action Area. The Resident Engineer or Project Manager will immediately contact the SFWO-approved biologist in the event that an Alameda whipsnake is observed within a construction zone. The Resident Engineer will suspend construction activities within a 50-foot radius of the animal until the animal leaves the site voluntarily or as a last option, the animal is captured and relocated according to SFWO-approved protocol.

AWS-14 Suitable Erosion Control Materials: Plastic monofilament netting (erosion control matting) or similar material will be prohibited from use on the project because the Alameda whipsnake may become entangled or trapped in it. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.

AWS-15 Limitation on Rodenticide Use: No rodenticides will be used at the project site during construction in areas that support suitable habitat for the Alameda whipsnake

AWS-16 Encounters with Species: Each Alameda whipsnake encounter will be treated on a case-by-case basis in coordination with the SFWO but general guidance is as follows: (1) leave the non-injured animal if it is not in danger; or, (2) move the animal to a nearby location if it is in danger. These options are further described as follows:

a. When an Alameda whipsnake is encountered in the Action Area the first priority is to stop all activities in the surrounding area that have the potential to result in the harm, injury, or death of the individual. The monitor then needs to assess the situation in order to select the course of action that will minimize adverse effects to the individual. Contact the SFWO once the site is secure. Contact the SFWO again prior to the start of construction to confirm the animal's status.
b. The first priority is to avoid contact with the animal and allow it to move out of the project footprint and hazardous situation on its own to a safe location. The animal will not be

picked up and moved because it is not moving fast enough or it is inconvenient for the construction schedule. This guidance only applies to situations where an animal is encountered while moving under conditions that make their upland travel feasible. This does not apply to animals that are uncovered or otherwise exposed or in areas where there is not sufficient adjacent habitat to support the life history of the Alameda whipsnake if they move outside the construction footprint.

c. Avoidance is the preferred option if the animal is not moving or is within some sort of burrow or other refugia. In this case, the area will be well marked for avoidance by construction and a SFWO-approved biological monitor will be assigned to the area when work is taking place nearby.
d. The animal will be captured and moved when it is the only option to prevent its death or injury.
e. If appropriate habitat is located immediately adjacent to the capture location then the preferred option is short distance relocation to that habitat. This must be coordinated with the SFWO, but the general guidance is the snake will not be moved outside of the area where it could have traveled on its own. Captured snakes will be released in appropriate cover as close to their capture location as possible for their continued safety. Under no circumstances will an animal be relocated to another property without the owner's written permission. It is the Subapplicant's responsibility to arrange for that permission.
f. The release must be coordinated with the SFWO and will depend on where the individual was found and the opportunities for nearby release. In most situations the release location is likely to be into the mouth of a small burrow or other suitable refugia.
g. Only SFWO-approved biologists for the project can capture Alameda whipsnakes.

Valley Elderberry Longhorn Beetle Conservation Measures

In general terms, the *May 2017 Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle* (VELB) will be followed. Below is a summary of some of the key measures to implement on Subapplicant's proposed projects that may affect VELB. If elderberry shrubs occur on or within 50 meters (165 feet) of the Action Area, adverse effects to VELB may occur as a result of project implementation. If the project may affect VELB or its habitat, appropriate avoidance and minimization measures are recommended. Not all measures may be appropriate for every project, and Subapplicants will implement the measures that are identified in the ESA Review Form for a specific project. FEMA will submit to the SFWO the completed ESA Review Form for projects that are covered under this programmatic biological opinion, outlining the applicable measures to protect VELB. This text is intended to provide language that may be used by the Subapplicants to describe avoidance and minimization measures for their proposed project.

VELB-1 Fencing: All areas to be avoided during construction activities will be fenced and/or flagged as close to construction limits as feasible.

VELB-2 Avoidance Area: Activities that may damage or kill an elderberry shrub (e.g., trenching, paving, etc.) may need an avoidance area of at least 6 meters (20 feet) from the drip-line, depending on the type of activity.

VELB-3 Worker Education: A SFWO-approved biologist will provide training for all contractors, work crews, and any onsite personnel on the status of the VELB, its host plant and habitat, the need to avoid damaging the elderberry shrubs, and the possible penalties for non-compliance.

VELB-4 Biological Monitor: A SFWO-approved biologist will monitor the work area at project-appropriate intervals to assure that all avoidance and minimization measures are implemented. The amount and duration of monitoring will depend on the project specifics and the contractor will discuss it with the SFWO-approved biologist.

VELB-5 Seasonal Avoidance: As much as feasible, all activities that could occur within 50 meters (165 feet) of an elderberry shrub will be conducted between August and February, outside of the flight season of the VELB, which occurs from March to July, coinciding with the bloom period of the elderberry plant.

VELB-6 Trimming: Trimming may remove or destroy VELB eggs or larvae and may reduce the health and vigor of the elderberry shrub. In order to avoid and minimize adverse effects to VELB when trimming, trimming will occur between November and February and will avoid the removal of any branches or stems that are ≥ 1 inch in diameter. Measures to address regular or large-scale maintenance (trimming) will be established in consultation with the SFWO.

VELB-7 Limitations on Chemical Use: Herbicides will not be used within the drip-line of the shrub. Insecticides will not be used within 30 meters (98 feet) of an elderberry shrub. All chemicals will be applied using a backpack sprayer or similar direct application method.

VELB-8 Mowing: Mechanical weed removal within the drip-line of the shrub will be limited to the season when adults are not active (August - February) and will avoid damaging the elderberry.

VELB-9 Erosion Control and Revegetation: Erosion control will be implemented and the affected area will be revegetated with appropriate native plants.

VELB-10 Transplanting: In order to protect VELB larvae to the greatest extent possible, we recommend that all elderberry shrubs with stems greater than 1 inch in diameter be transplanted under the following conditions:

a. If the elderberry shrub cannot be avoided.
b. If indirect effects will result in the death of stems or the entire shrub.

Removal of entire elderberry plants without disturbance to the surrounding habitat is uncommon, but may occur on certain projects. The removal may either include the roots or just the removal of the aboveground portion of the plant. The SFWO encourages project applicants to attempt to remove the entire root ball and transplant the shrub, if possible. In order to minimize the fragmentation of VELB habitat, the SFWO encourages applicants to relocate elderberry shrubs as close as possible to their original location. Elderberry shrubs may be relocated adjacent to the project footprint if: 1) the planting location is suitable for elderberry growth and reproduction; and 2) the project proponent is able to protect the shrub and ensure that the shrub becomes reestablished. If these criteria cannot be met, the shrub may be transplanted to an appropriate SFWO-approved mitigation site. Any elderberry shrub that is unlikely to survive transplanting because of poor condition or location, or a shrub that will be extremely difficult to move because of access problems, may not be appropriate for transplanting. The following transplanting guidelines may be used by agencies/applicants in developing their VELB conservation measures:

<u>Monitor.</u> A SFWO-approved biologist will be onsite for the duration of transplanting activities to assure compliance with avoidance and minimization measures and other conservation measures.

Exit Holes. Exit-hole surveys will be completed immediately before transplanting. The number of exit holes found, GPS location of the plant to be relocated, and the GPS location of where the plant is transplanted will be reported to the Service and to the California Natural Diversity Database (CNDDB).
Timing. Elderberry shrubs will be transplanted when the shrubs are dormant (November through the first two weeks in February) and after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the shrub and increase transplantation success.
Transplanting Procedure. Transplanting will follow the most current version of the ANSI A300 (Part 6) guidelines for transplanting (http://www.tcia.org/).
Trimming Procedure. Trimming will occur between November and February and will minimize the removal of branches or stems that exceed 1 inch in diameter.

VELB-11 Impacts to Individual Shrubs: In certain instances, impacts to elderberry shrubs, but not the surrounding habitat may occur. This could take the form of trimming or complete removal of the plant. Trimming elderberry shrubs may result in injury or death of eggs, larva, or adults depending on the timing and extent of the trimming. Since the larva feed on the elderberry pith while they are developing, any trimming that may affect the health of the plant and cause the loss of stems may kill any larva in those stems. No adverse impacts to the VELB will occur if trimming does not remove stems/branches that are ≥1 inch in diameter and is conducted between November and February. Trimming that occurs outside of this window or removes branches ≥ 1 inch in diameter may result in adverse effects to VELB. In order to assess the risk of take from trimming activities, we recommend the following be evaluated:

a. Conduct an exit hole survey on the plant.
b. Evaluate the surrounding habitat (riparian vs. non-riparian).
c. Evaluate the potential suitability of the plant to provide VELB habitat.
    i. Riparian plants are much more likely to be occupied or colonized by VELB.
    ii. Plants in non-riparian locations will be evaluated using the criteria in Figure 2.

VELB-12 Other Activities: The SFWO's Framework for VELB may not be applicable for restoration, floodway maintenance, and other large scale habitat modification activities. These activities and the potential effects to VELB and its habitat will be considered on a project-by-project basis and discussed with the SFWO. The SFWO recommends that project proponents consider the effects to the species on a landscape level and ultimately seek to protect, preserve, and restore the continuity of VELB habitat. These and similar activities that may adversely impact the VELB and its habitat at landscape scales will consider avoidance and minimization strategies that are appropriate for the specific project. Some possible conservation measures to consider for these large-scale projects include:

a. Transplanting all affected elderberries to a similar onsite location.
b. Maintaining patches of appropriate habitat in areas where large-scale removal of elderberry shrubs will occur.
c. Scale trimming, removal, and other activities that allow VELB to persist within the area.

California Freshwater Shrimp Conservation Measures

CAFS-1 Biological Monitor: A SFWO-approved biologist will conduct surveys of suitable habitat within the Action Area for presence of the California freshwater shrimp in the work area 24 hours prior to any vegetative clearing work, dewatering, or ground disturbing activities.

CAFS-2 Species Observations and Handling Protocol: If California freshwater shrimp are present in the Action Area the following procedures will be used:

a. Prior to any California freshwater shrimp handle/capture activities, the SFWO will be contacted to identify relocations sites and options appropriate for the species in the location of the project activity.
b. California freshwater shrimp will be captured by hand-held nets [e.g., heavy-duty aquatic dip nets (12" D-frame net) or small minnow dip nets] and relocated out of the work area in the net or placed in buckets containing stream water and then moved directly to the nearest suitable habitat in the same branch of the creek. Suitable habitat will be identified prior to capturing California freshwater shrimp to minimize holding time. Suitable habitat is defined as creek sections that will remain wet over the summer and where banks are structurally diverse with undercut banks, exposed fine root systems, overhanging woody debris, or overhanging vegetation. No California freshwater shrimp will be placed in buckets containing other aquatic species.
c. Once the SFWO-approved biologist has determined that all shrimp have been effectively relocated, barrier seines or exclusion fencing no greater than 5 mm will be installed to prevent shrimp from moving back in, as appropriate.
d. Only SFWO-approved biologists will participate in the capture, handling, and monitoring of California freshwater shrimp. The SFWO-approved biologist will report the number of captures, releases, injuries, and mortalities to the Service within 30 days of project completion. If take exceeds the levels anticipated in this programmatic biological opinion, work will stop immediately and the SFWO will be notified within one working day.

CAFS-3 Seasonal Avoidance: No work during wet weather or where saturated ground conditions exist; if a 60% chance of a one half inch of rain or more within a 24-hour period is forecasted, then operations will cease until 24 hours after rain has ceased.

CAFS-4 Habitat Protection: Habitat for this species will be protected, as follows:

a. No large woody debris (LWD) will be removed in active (wetted) channels. Trees may be removed for access routes for construction equipment. If trees need to be removed from other portions of the project site, willows over 3 inches in diameter at breast height will not be removed and there will be no reduction in canopy cover provided by hardwoods or conifers.
b. Disturbance and removal of aquatic vegetation will be minimized to the extent practicable. Downed trees, stumps and other basking sites and refuges within these aquatic habitats will remain undisturbed as much as possible.

CAFS-5 Revegetation: The stream bank will be planted with species which will enhance the year-round habitat value of the stream edge by providing adequate shelter, stability, complexity and food production potential for California freshwater shrimp. The revegetation will include plantings such as widely spaced trees, willow sprigs, and sedges near the water's edge, plantings of herbaceous plant species to fill in gaps and therefore augment existing habitat.

CAFS-6 Site Restrictions: New access routes requiring tree removal and grading will be limited to no more than two. Access routes will not be along the top of the stream bank but relatively perpendicular (45 to 90 degrees is acceptable) to the bank.

CAFS-7 Site Access: Where available, access to the work area will use existing ingress or egress points, or work will be performed from the top of the stream banks.

CAFS-8 Erosion Control: Any disturbed ground must receive appropriate erosion control treatment (mulching, seeding, planting, etc.) prior to the end of the construction season, prior to ceasing operations due to forecasted wet weather, and within seven days of project completion. Operations will use all feasible techniques to prevent any sediment from entering a drainage system.

CAFS-9 Suitable Erosion Control Materials: Erosion control materials will not include plastic mono-filament netting or similar materials in which animals might become entangled.

CAFS-10 Cleanup After Construction: Work pads, falsework, and other construction items will be removed from the 100 year floodplain by the end of the construction window.

CAFS-11 Construction Design: Prior to removal of an existing structure, a debris catching platform will be constructed under the structure.

CAFS-12 Waste Management: Trash will be properly contained, removed from the work areas, and disposed of regularly. Following construction, all trash and construction debris will be removed from the Project footprint.

CAFS-13 Fueling Restrictions: Fueling and maintenance of vehicles and equipment will occur at least 50 feet from any riparian or aquatic habitat. Prior to the start of construction a plan will be prepared to ensure a prompt and effective response to any accidental spills. All workers will be informed of the importance of preventing spills and of the appropriate measures to take if a spill occurs.

Multiple Butterfly Species Conservation Measures

Butterfly Species	Bloom/Flight Season	Host Plants
Bay Checkerspot Butterfly	February - early May	California plantain (*Plantago erecta*), purple owl's clover (*Castilleja densiflora*) and exserted paintbrush (*C. exserta*)
Callipe Silverspot Butterfly	mid-May - late July	Johnny jump-up (*Viola pedunculata*)
Mission Blue Butterfly	Late March - early July	Three lupine species (*Lupinus albifrons, L. formosus;* and *L. varicolor*)
Myrtle's silverspot butterfly	mid-June - early October	western dog violet (*Viola aduca*)
San Bruno elfin	Late February - mid-April	Stone crop (*Sedum spathulifolium*)

LEP-1 Pre-construction Surveys: The Subapplicant will implement the following measure depending on the time of year for project construction:

a. During the non-flight season, pre-construction surveys for caterpillars and the larval host plants will be conducted during the typical bloom season. A SFWO-approved biologist, able to identify the larval host plants and caterpillars of the listed butterfly species, will conduct up to three surveys prior to the start of construction to determine the use of the site by the listed butterflies.

b. During the flight season, pre-construction surveys for butterflies and the larval host plants will be conducted. A SFWO-approved biologist, able to identify the butterflies and their host plants, will conduct up to three surveys prior to the start of construction to determine the use of the site by the listed butterflies. If flight surveys are not possible, then the butterfly species associated with the larval host plant will be assumed present.

LEP-2 Biological Monitor: During the adult flight season of listed butterfly species, a SFWO-approved biologist will be present when construction activities occur in or within 100 feet of suitable habitat (dispersal habitat as well as areas containing the larval host plant and adult food plants). If one or more adult listed butterflies are observed in the work area, work activities will temporarily cease unless the SFWO-approved biologist determines that work activities will not directly affect the individual(s).

LEP-3 Fencing: Any larval food plants found within 300 feet of the project footprint will be clearly marked and will be avoided to the maximum extent practicable. Orange fencing/flagging will be placed along the edge of the work area near any larval food plants to prevent workers and vehicles from entering this area. Fencing/flagging will be installed prior to any ground disturbing or vegetation removal activities. A SFWO-approved biologist will supervise the installation of flagging or fencing around stands of known listed butterfly host/food plants. The fencing/flagging will be placed the maximum distance from the plants possible (up to 100 feet), while still allowing work to occur in the adjacent area. The location of the flagging/fencing will be field-adjusted by the SFWO-approved biologist as necessary. The temporary fencing/flagging will be furnished, constructed, maintained, and later removed and specified in the construction bid documents. Temporary fencing/flagging will be at least 4-foot-high and constructed of high visibility material (e.g., orange, commercial- quality woven polypropylene or similar material). No construction activities will be permitted within the fenced/flagged area. Warning signs indicating the sensitivity of the area will be attached to the fencing/flagging.

LEP-4 Monitoring Log: Each day the SFWO-approved biologist will monitor for listed butterflies, inspect the fencing/flagging and immediately notify the resident engineer (or their designated contact) to address any necessary fencing/flagging repairs. A biological monitoring log of construction site conditions and observations will be maintained and kept on file.

LEP-5 Dust Control: The SFWO-approved biologist will ensure that dust is controlled during construction by periodically watering down construction areas within 100 feet of listed butterfly habitat as necessary. Watering down the construction area will prevent dirt from becoming air borne and accumulating on larval host plants and adult food source plants for listed butterflies.

Conservation Measures for Vernal Pool Fairy Shrimp, Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, Vernal Pool Tadpole Shrimp

To avoid and minimize adverse effects to the vernal pool branchiopods, the measures listed below will be implemented in the project footprint where suitable listed branchiopod habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur.

VPBR-1 Pre-construction Surveys: If possible, prior to construction activities, the SFWO-approved biologist will conduct pre-construction, reconnaissance surveys in seasonally inundated habitats (seasonal wetland, non-inundated wetlands) within the project footprint. The SFWO-approved biologist will conduct general aquatic surveys at a suitable interval after the first significant storm event of the rainy season (October 15 to June 1), prior to construction activities. The surveys

will include a habitat assessment of the hydrological, biological, and ecological conditions of each seasonal wetland and open waters. The habitat assessment will provide information regarding the quality and suitability of seasonal wetlands for the vernal pool branchiopods covered under this programmatic biological opinion (vernal pool fairy shrimp, Conservancy fairy shrimp, longhorn fairy shrimp, and vernal pool tadpole shrimp). If any vernal pool branchiopods are found during the surveys, the SFWO-approved biologist will submit a report to the SFWO within 1 month of completing the field work. The report will provide results of all surveys, a summary of all the data collected, and the habitat assessment. If surveys are not possible, then listed vernal pool branchiopod species presence will be assumed on all suitable habitat within the Action Area.

VPBR-2 Biological Monitor: A SFWO-approved biologist will monitor all construction activities within 250 feet of suitable habitat for listed vernal pool branchiopods to ensure that no unnecessary take or destruction of habitat occurs.

VPBR-3 Exclusion Areas: Non-disturbance exclusion zones will be established, maintained, and monitored by a SFWO-approved biological monitor to ensure that take of vernal pool branchiopods or destruction of their habitat does not occur outside of the project footprint, in areas where suitable habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur. A buffer of at least 250 feet from any vernal pool, vernal pool grassland, or seasonal wetland will be established for the following:

a. Staging areas of all equipment for storage, fueling, and maintenance with hazardous material absorbent pads available in the event of a spill; and
b. Mixing of pesticides, herbicides, or other potentially toxic chemicals.

VPBR-4 Seasonal Avoidance: Work within 250 feet of suitable listed vernal pool branchiopod habitat (e.g., vernal pools, seasonal wetlands) will be performed between June 1 and October 15 under dry site conditions to the maximum extent possible to minimize adverse impacts to aquatic habitats.

VPBR-5 Work Restrictions During Dry Season: A SFWO-approved biologist will flag or monitor all operations and maintenance work during the *dry season* (generally June 1 to October 15) within 250 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:

a. hand-held herbicide application is prohibited within the pool or at the edge of the pool;
b. power spray herbicide application is prohibited within 100 feet of the edge of the pool;
c. broadcast herbicide application is prohibited within 150 feet of the edge of the pool; and
d. ground-disturbing activities are prohibited within 25 feet of the edge of the pool.

VPBR-6 Work Restrictions During Wet Season: If any construction activities remain and must occur during the October 15 - June 1 *wet period*, exclusion fencing and erosion control materials will be placed around the vernal pools and other seasonal wetlands as determined by the SFWO-approved biologist to reduce sedimentation into vernal pool habitat. The fencing will provide a buffer between construction activities and the vernal pools and other seasonal wetlands. The SFWO-approved biologist will erect and maintain the exclusion fencing.

VPBR-7 Erosion Control: Any vernal pool, vernal pool grassland, or seasonal wetland will be protected from siltation and contaminant runoff by use of erosion control. Erosion-control measures will be placed between the outer edge of the buffer and the activity area.

VPBR-8 Suitable Erosion Control Materials: Erosion-control materials will be of a tightly woven natural fiber netting or similar material that will not entrap reptiles and amphibians (e.g., coconut coir matting). No micro-filament netting will be used. All fiber rolls and hay bales used for erosion control will be certified as free of noxious weed seed.

VPBR-9 Dust Control: Dust control measures will be implemented to prevent the transport of soil from exposed surfaces to vernal pool, swale, and rock pool habitat. Sprinkling with water will not be done in excess to minimize the potential for non-storm water discharge.

VPBR-10 Monitoring During Wet Season: A SFWO-approved biologist will flag or monitor all operations and maintenance work during the *wet season* (generally October 1 to June 1) within 150 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:

a. Hand-held herbicide application is prohibited within 25 feet of the edge of the pool;
b. Power spray herbicide application is prohibited within 100 feet of the edge of the pool;
c. Broadcast herbicide application is prohibited within 150 feet of the edge of the pool;
d. Manual clearing of vegetation is prohibited at the pool or beyond the edge of the pool;
e. Mechanical clearing of vegetation is prohibited within 100 feet of the edge of the pool; and
f. Ground-disturbing activities are prohibited within 50 feet of the edge of the pool.

VPBR-11 Vehicle Maintenance: Vehicles will be inspected daily for fluid leaks before leaving a staging area.

VPBR-12 Site Restrictions: Routine maintenance activities within 250 feet of vernal pool and swale habitat will be avoided to the maximum extent possible.

VPBR-13 Use of Native Plants for Revegetation: When revegetating upland areas to pre-project condition, native plants will be used to the maximum extent practicable.

VPBR-14 Invasive Plant Species Prevention: To minimize the introduction of invasive plant species, construction vehicles will be cleaned prior to any work within 150 feet of vernal pool branchiopod habitat.

Conservation Measures for Vernal Pool Listed Plants

These measures apply to the following 19 listed vernal pool plant species: Burke's goldfields (*Lasthenia burkei*), Butte County meadowfoam (*Limnanthes floccosa ssp. californica*), Calistoga allocarya (*Plagiobothrys strictus*), Colusa grass (*Neostapfia colusana*), Contra Costa goldfields (*Lasthenia conjugens*), few-flowered navarretia (*Navarretia leucocephala ssp. pauciflora [=N. pauciflora*]), fleshy owl's-clover (*Castilleja campestris ssp. succulenta*), Greene's tuctoria (*Tuctoria greenei*), hairy Orcutt grass (*Orcuttia pilosa*), Hoover's spurge (*Chamaesyce hooveri [=Euphorbia hooveri*]), Lake County stonecrop (*Parvisedum leiocarpum [=Sedella leiocarpa*]), Loch Lomond coyote thistle (*Eryngium constancei*), many-flowered navarretia (*Navarretia leucocephala ssp. plieantha*), Sacramento Orcutt grass (*Orcuttia viscida*), San Joaquin Orcutt grass (*Orcuttia inaequalis*), Sebastopol meadowfoam (*Limnanthes vinculans*), Slender Orcutt grass (*Orcuttia tenuis*), Solano grass (*Tuctoria mucronata*), and Sonoma sunshine (*Blennosperma bakeri*).

To avoid and minimize adverse effects to the vernal pool plants, the measures listed below will be implemented in the project footprint where suitable vernal pool habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur.

VP PLANT-1 Pre-construction Surveys: If possible, prior to construction activities, the SFWO-approved biologist will conduct protocol-level bloom-season plant surveys in seasonally inundated habitats (seasonal wetland, non-inundated wetlands) within the project footprint. If any listed vernal pool plant species are found during the surveys, the SFWO-approved biologist will submit a report to the SFWO within 1 month of completing the field work. The report will provide results of all surveys, a summary of all the data collected, and the habitat assessment. Information regarding the location of listed plant populations will be provided to CDFW's California Natural Diversity Database (CNNDB) according to their reporting protocols. If surveys are not possible, then listed vernal pool species presence will be assumed on all suitable habitats within the Action Area.

VP PLANT-2 Flagging: Flagging or other field markers identifying the plants, or in the event protocol-level surveys were not conducted – the suitable habitat, will be placed prior to each work event and removed after that work event is completed for all phases of the proposed project.

VP PLANT-3 Biological Monitor: A SFWO-approved biologist will monitor all construction activities within 250 feet of suitable habitat for listed vernal pool plants to ensure that no unnecessary loss or destruction of habitat occurs.

VP PLANT-4 Exclusion Areas: A SFWO-approved biologist will delineate a 50-foot avoidance buffer around all federally-listed plants or their suitable habitat. The non-disturbance exclusion zones will be established, maintained and monitored by a SFWO-approved biological monitor to ensure that loss of listed vernal pool plants or destruction of their habitat does not occur outside of the project footprint where suitable habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur. In addition, a buffer of at least 250 feet from any vernal pool, vernal pool grassland, or seasonal wetland will be established for the following:

a. Staging areas of all equipment for storage, fueling, and maintenance with hazardous material absorbent pads available in the event of a spill; and
b. Mixing of pesticides, herbicides, or other toxic chemicals.

VP PLANT-5 Seasonal Avoidance: Work within 250 feet of suitable listed vernal pool plant habitat (e.g., vernal pools, seasonal wetlands) will be performed between June 1 and October 15 under dry site conditions to the maximum extent possible to minimize adverse impacts to aquatic habitats.

VP PLANT-6 Work Restrictions During Dry Season: A SFWO-approved biologist will flag or monitor all operations and maintenance work during the *dry season* (generally June 1 to October 15) within 250 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:

a. Hand-held herbicide application is prohibited within the pool or at the edge of the pool;
b. Power spray herbicide application is prohibited within 100 feet of the edge of the pool;
c. Broadcast herbicide application is prohibited within 150 feet of the edge of the pool; and
d. Ground-disturbing activities are prohibited within 25 feet of the edge of the pool.

VP PLANT-7 Work Restrictions During Wet Season: If any construction activities remain and must occur during the October 15 - June 1 *wet period*, exclusion fencing and erosion control materials will be placed around the vernal pools and other seasonal wetlands as determined by the SFWO-approved biologist to reduce sedimentation into vernal pool habitat. The fencing will provide a

buffer between construction activities and the vernal pools and other seasonal wetlands. The SFWO-approved biologist will erect and maintain the exclusion fencing.

VP PLANT-8 Erosion Control: Any vernal pool, vernal pool grassland, or seasonal wetland will be protected from siltation and contaminant runoff by use of erosion control. Erosion-control measures will be placed between the outer edge of the buffer and the activity area.

VP PLANT-9 Suitable Erosion Control Materials: Erosion-control materials will be of a tightly woven natural fiber netting or similar material that will not entrap reptiles and amphibians (e.g., coconut coir matting). No micro-filament netting will be used. All fiber rolls and hay bales used for erosion control will be certified as free of noxious weed seed.

VP PLANT-10 Dust Control: Dust control measures will be implemented to prevent the transport of soil from exposed surfaces to vernal pool, swale, and rock pool habitat. Sprinkling with water will not be done in excess to minimize the potential for non-storm water discharge.

VP PLANT-11 Monitoring During Wet Season: A SFWO-approved biologist will flag or monitor all operations and maintenance work during the *wet season* (generally October 1 to June 1) within 150 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:

a. Hand-held herbicide application is prohibited within 25 feet of the edge of the pool;
b. Power spray herbicide application is prohibited within 100 feet of the edge of the pool;
c. Broadcast herbicide application is prohibited within 150 feet of the edge of the pool;
d. Manual clearing of vegetation is prohibited at the pool or beyond the edge;
e. Mechanical clearing of vegetation is prohibited within 100 feet of the edge of the pool; and
f. Ground-disturbing activities are prohibited within 50 feet of the edge of the pool.

VP PLANT-12 Vehicle Maintenance: Vehicles will be inspected daily for fluid leaks before leaving a staging area.

VP PLANT-13 Site Restrictions: Routine maintenance activities within 250 feet of vernal pool and swale habitat will be avoided to the maximum extent possible.

VP PLANT-14 Use of Native Plants for Revegetation: When revegetating upland areas to pre-project condition, native plants will be used to the maximum extent practicable.

VP PLANT-15 Invasive Plant Species Prevention: To minimize the introduction of invasive plant species, construction vehicles will be cleaned prior to entering any vernal pool habitat.

Tidewater Goby Conservation Measures

TIGO-1 Installation of In-water Nets: Prior to initiation of dewatering or sediment removal work, a Service-approved biologist will install 1/8 inch block nets outside the impact areas and across the stream a minimum of 20 feet above and below the locations proposed for excavation. If widely separated sites are involved, more than one set of block nets will be placed to protect the work area. The nets will be installed on the first day of work and monitored thereafter for the duration of the work.

TIGO-2 Environmental Awareness Training: Prior to initiation of dewatering or sediment removal work, hold an environmental awareness training to inform maintenance and management personnel about tidewater gobies, including tidewater goby protected status, proximity to the project site, avoidance/minimization measures to be implemented during the particular project, and the implications of violating the Act and FEMA funding conditions.

TIGO-3 Capture and Relocation: Once the block nets are secured, a Service-approved biologist(s) will remove all tidewater gobies found between the block nets using a 1/8 inch seine and dip nets, and relocate tidewater gobies to suitable habitat downstream of the Action Area. If excavation of a given extent of a basin cannot be completed in one day, a new set or successive sets of block nets will be deployed each day, and subsequent surveys and capture/relocation performed accordingly. Fish released from one day's work will not be released into areas projected to be excavated on successive days.

TIGO-4 Flagging: Clearly flag the limits of construction areas to avoid or minimize impacts to adjacent riparian and upland habitat. Flagging will be no more than 50 feet apart and will be clearly visible to construction workers on the ground and to operators on heavy equipment.

TIGO-5 Erosion Control: Implement erosion and sedimentation control measures (e.g., silt fences, straw bales or wattles) in all areas where disturbed substrate may potentially wash into waters via rainfall or runoff, particularly around stockpiled material and at the downstream end of each project reach. Such measures will remain in place and be inspected periodically until the project is complete and exposed soils are stabilized. Diversion structures, sediment traps/basins and associated equipment (e.g., pumps, lines) will be maintained in optimal working condition for the entire duration of the preparation and construction periods.

TIGO-6 Biological Monitor: A Service-approved biological monitor will remain onsite and search for tidewater gobies and assess turbidity levels within the work areas during all dewatering activities, and will capture and relocate tidewater gobies to suitable habitat as necessary.

TIGO-7 Reporting: Provide a written summary of work performed (including biological survey and monitoring results), best management practices implemented (i.e., use of biological monitor, flagging of work areas, erosion and sedimentation controls) and supporting photographs of each stage. Furthermore, the documentation describing listed species surveys and re-location efforts (if appropriate) will include name of biologist(s), location and description of area surveyed, time and date of survey, all survey methods used, a list and tally of all sensitive animal species observed during the survey, a description of the instructions/recommendations given to the applicant during the project, and a detailed discussion of capture and relocation efforts (if appropriate).

TIGO-8 Hydrology and Topography Protection: Project activities will avoid creation of berms and dykes, steepening of channel slopes, placement of rock slope protection, and other actions that could result in alteration of hydrology, changes to water surface elevation levels, increased flooding, changes to flow velocities, and increased scour within tidewater goby designated critical habitat. However, the in-kind replacement of existing or damaged rock slope protection may occur.

TIGO-9 Limits on Habitat Disturbance: Project activities will not result in permanent loss of tidewater goby designated critical habitat unless the impacts to habitat are determined to be insignificant via project-level consultation (i.e., small permanent impacts that will have a negligible effect on habitat quality for tidewater goby).

Southwestern Willow Flycatcher

SWWF-1 Habitat Assessment: A habitat assessment will be conducted by a Service-approved biologist to determine whether suitable habitat (including foraging, nesting, and dispersal) for the flycatcher occurs in the action area. If suitable habitat for this species is identified in the Action Area and the proposed project may affect suitable habitat that is not known to be occupied by the flycatcher, the Service will be contacted regarding the need for surveys according to Service protocol and those surveys will be conducted, as appropriate. Otherwise, if the Service agrees based on other biological data or reasoning, the species will be determined present in areas with suitable habitat.

SWWF-2 Habitat Buffer: If project activities are conducted during the breeding season (i.e., May 1-September 1), a 500-foot disturbance-free buffer will be established and demarcated by fencing or flagging around occupied habitat. This buffer may be adjusted provided noise levels do not exceed 60 dBA at the edge of the nest site. If the noise meets or exceeds the 60 dBA threshold, or if the biologist determines that the construction activities are disturbing nesting activities, the biologist will have the authority to halt the construction and will devise methods to reduce the noise and/or disturbance in the vicinity.

SWWF-3 No Permanent or Temporary Loss of Habitat: No permanent or temporary loss of flycatcher occupied or designated critical habitat will occur (within or outside of the breeding season).

Least Bell's Vireo Conservation Measures

LBV-1 Habitat Assessment: A habitat assessment will be conducted by a biologist to determine whether suitable habitat (including foraging, nesting, and dispersal) for the least Bell's vireo occurs in the Action Area. If suitable habitat for this species is identified in the Action Area and the proposed project may affect suitable habitat that is not known to be occupied by the least Bell's vireo, the Service will be contacted regarding the need for surveys according to Service protocol and those surveys will be conducted, as appropriate. With Service concurrence, FEMA may also forgo surveys by making a determination that suitable habitat is occupied for the purposes of section 7 consultation.

LBV-2 Seasonal Avoidance: To minimize direct effects to nesting least Bell's vireos, all clearing of vegetation within occupied habitat will occur outside the breeding season (i.e., March 15-September 15) to the maximum extent practicable. If the breeding season cannot be avoided, a Service-approved biologist will conduct preconstruction nesting bird surveys, at least 48 hours before and no more than 1 week prior to vegetation removal. If no active nests are found to occur within 300 feet of the Action Area, project activities may proceed.

LBV-3 Work Restrictions Near Active Nests: If an active nest is detected during the survey, either work will be suspended until the young have fledged/beginning of the non-breeding season OR the following will apply:

a. An exclusionary buffer will be established around the nest. The buffer distance will be determined by the Service-approved biologist considering several factors: presence of natural buffers (vegetation/topography), nest height, location of foraging territory, nature of the proposed activities, and baseline levels of noise and human activity. The buffer may range from 50 feet to over 300 feet in width. AND
b. A biologist will monitor the nest during construction for signs of adverse effects including

distress/disturbance (unless "take" is authorized). If adverse effects are detected then the Service-approved biologist will have the authority to stop all construction activating in the vicinity of the nest and will coordinate with the Service to determine whether additional conservation measures will avoid or minimize effects on the nesting birds. Construction may resume only with approval from the Service. AND

c. If construction must occur within the buffer and exclusion zones or otherwise may cause adverse effects on the least Bell's vireo, then take may be authorized and disturbance may occur (as covered under this programmatic biological opinion). Unanticipated adverse effects on the least Bell's vireo will require reinitiation of consultation.

LBV-4 Habitat Avoidance: Staging and temporary construction areas will be located outside of suitable habitat and will utilize existing roads and developed areas to the extent possible. All mature riparian vegetation (e.g., willows and cottonwoods), that are greater than 30 feet in height, will be avoided to the maximum extent possible. If mature riparian vegetation cannot be avoided, it will be either transplanted elsewhere within or near the Action Area or placed horizontally or diagonally outside the project footprint under the direction of a Service-approved biologist.

LBV-5 Habitat Restoration Plan: Prior to construction, prepare a Restoration Plan will be prepared that describes the efforts to restore all the areas of suitable habitat for the least Bell's vireo that were temporarily impacted. The Restoration Plan will be reviewed and approved by the Service.

LBV-6 Limits on Habitat Disturbance: For any specific project, temporary impacts on occupied or designated critical habitat by the least Bell's vireo will be limited to a maximum of 1 acre. Temporary impacts from all the projects covered under this programmatic consultation will also be limited to a maximum of 20 acres of least Bell's vireo occupied or designated critical habitat. In addition, impacts will be limited to 10 territories.

LBV-7 No Permanent Loss of Habitat: No permanent loss of occupied or designated critical habitat for the least Bell's vireo will occur unless the impact to habitat are determined to be insignificant via project-level consultation (i.e., small permanent impacts that will have negligible effect on habitat quality for the least Bell's vireo).

California Least Tern Conservation Measures

CLT-1 Seasonal Avoidance: To avoid the nesting season of the California least tern, project activity in occupied habitat will be allowed from September 30-March 31. Occupied habitat for this species is well documented online. If project activities occur during the nesting season, they will occur at least 800 feet away from California least tern occupied habitat, and noise within occupied habitat will be monitored to ensure that it does not exceed 60 dBA hourly.

CLT-2 Biological Monitor: A Service-approved biologist will monitor all construction activities within occupied habitat to ensure that no take of the species or destruction of occupied habitat occurs. The Service-approved biologist will have stop work authority if adverse effects of nesting California least terns are observed.

CLT-3 Use of Handheld Tools: Non-breeding season project activity in occupied habitat will be limited to the use of handheld tools, including handheld motorized implements such as chain saws and power augers. Tools will be washed prior to use in these habitats to reduce the spread of non-native and invasive plant species and their seeds. No heavy equipment will be allowed within suitable nesting habitats. If handheld motorized tools are used, operators will employ best management

practices to avoid and minimize soil and water contamination from fuel and lubricants. Measures include: a) use spill-resistant fuel and lubricant containers; b) use a portable containment pad for re-fueling in the field; c) immediately report petroleum spills to the landowner, or land management agency, and notify appropriate local authorities for advice and action on containment and cleanup of spills; and d) clearly mark the location and/or boundaries of the spill site to enable rapid remedial action.

CLT-4 Habitat Protection: No soil stabilization materials or offsite materials (e.g., decomposed granite, soil, rocks, etc.) will be added to the surface within occupied habitat. No excavation or grading will be allowed within occupied habitat either.
CLT-5 Flagging: When necessary to minimize the area affected by the project, work site boundaries will be marked with flagging or other visible materials, which will be removed at the conclusion of the project.

CLT-6 Avoid Placement of Predator Perches: Workers will avoid temporary or permanent placement of structures (e.g., posts, railings, tall equipment, or fence lines) that could provide elevated perches for predatory birds near or within occupied habitat.

CLT-7 Access Restrictions: Access to work sites in occupied habitat will be by foot travel only. Motorized vehicles, including all-terrain vehicles, will not be used in occupied habitat.

CLT-8 Restoration of Work Areas: At the conclusion of the project, areas temporarily affected by project activity will be restored to their pre-project condition (for example, footpaths will be raked to their original ground contour and native vegetation will be reestablished, if necessary).

CLT-9 Waste Management: Trash, food, food containers, and food waste will be secured at all times by individual workers, or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.

Marbled Murrelet Conservation Measures

MAMU-1 Work Restrictions in Occupied Habitat: If marbled murrelet surveys (using the 2003 Service survey protocol; Evans Mack *et al.* 2003) determine that the Action Area is occupied **or** if FEMA or the Service presumes marbled murrelet occupancy without conducting surveys, the project Subapplicant will adhere to the following Conservation Measures. Surveyors are required to meet or exceed all training recommendations in Evans Mack et al. (2003), and be registered as qualified surveyors on a current Service 10(a)(1)(A) Recovery Permit.

a. Vegetation Removal or Alteration of Known or Potential Nest Trees:

    i. No potential marbled murrelet nest trees will be removed during nesting season (24 March to 15 September). Potential habitat defined as: (1) mature (with or without an old-growth component) and old-growth coniferous forests; and (2) younger coniferous forests that have platforms (relatively flat, at least 4-inch diameter and at least 33 feet above the base of the live crown of a coniferous tree). Platform presence is more important than tree size.
    ii. Avoid removing or damaging known or potential nest trees, unless they are a confirmed safety hazard. For sites that have not been surveyed according to 2003 survey protocol, potential habitat is defined as (1) mature (with or without an old-

growth component) and old growth coniferous forests; **and** (2) younger coniferous forest that have platforms.

iii. Avoid removing or damaging trees with potential nesting platforms. A platform is a relatively flat surface at least 4-inch diameter and 33-feet high in the live crown of a coniferous tree. Platforms can be created by a wide bare branch, moss or lichen covering a branch, mistletoe, witches brooms, or other deformities, or structures such as squirrel nests.

iv. Project activities will not remove the function of suitable nesting habitat.
   - While habitat elements may be removed, such as individual large trees if they are a confirmed safety hazard, from nesting habitat, the treatment must not be so extensive as to remove the overall function of the nesting habitat, and will be conducted outside of the nesting season.

v. Non-suitable nest trees or limb trimming or pruning, brush trimming or removal, and hazard tree felling within suitable habitat may occur outside of the nesting season, 16 September to 23 March.

b. Auditory, Visual, or Other Disturbance:

i. Construction equipment must be in good working order, with emphasis on hydraulic and noise abatement systems. Hydraulic leakage and damaged mufflers (or spark arresters) must be promptly addressed and remedied to the degree practicable.

ii. No proposed activity generating sound levels 20 or more decibels above ambient sound levels **<u>or</u>** with maximum sound levels (ambient sound levels plus activity-generated sound levels) above 90 decibels (excluding vehicle back-up alarms) may occur within suitable marbled murrelet nesting habitat during the majority of the murrelet nesting season (*i.e.,* 24 March to 05 August)(Service 2006f).

iii. Between August 06 (date when most marbled murrelets have fledged in coastal northern California) and September 15 (end of marbled murrelet nesting season) of any year, project activities, with adjacent suitable nesting habitat, that will generate sound levels ≥10 dB above ambient sound levels will observe a daily work window beginning 2 hours post-sunrise and ending 2 hours pre-sunset. However, prep work that does not generate sound levels above ambient sound levels, including street sweeping and manual removal of pavement markers, can occur during all hours. The need for this daily work window depends on the distance between suitable nesting habitat and the above-ambient sound generating activity following the Service guidelines (Service 2006f). For example, if above-ambient sound levels generated by proposed activities will become attenuated back down to ambient sound levels prior to reaching suitable nesting habitat, the daily work window will not be necessary.

iv. No human activities will occur within visual line-of-sight of 40 m (131 feet) or less from a known nest or suitable nest tree during the nesting season (24 March to 15 September) (Service 2006f).

MAMU-2 Work Restrictions in Unoccupied Habitat: If recent protocol surveys determine that all suitable marbled murrelet nesting habitat within the Action Area is considered unoccupied, the auditory, visual, and other disturbance measures listed above do not apply for habitat determined to be unoccupied.

MAMU-3 Work Restrictions in Marbled Murrelet Critical Habitat: Ensure that there are no "adverse effects" to designated critical habitat for marbled murrelet within the Action Area. However, the Service has no specific quantitative thresholds, above which there will likely be an

adverse effect to critical habitat. If a Subapplicant's proposed project encounters this situation, contact the Service to determine whether proposed habitat removal within designated critical habitat constitutes an adverse effect. Generally, the removal of a few small trees in unoccupied habitat will not result in "adverse effect" on designated critical habitat.

When working in designated critical habitat for marbled murrelet, all measures described in MAMU-1 Occupied Habitat, or MAMU-2 Unoccupied Habitat for reducing impacts in suitable habitat will also be implemented. This will help reduce effects, and may result in some instances in effects that are insignificant and discountable.

Western Snowy Plover Conservation Measures

The following avoidance and minimization measures apply to Action Areas within suitable snowy plover nesting habitat and designated critical habitat regardless of whether snowy plovers have been detected during Service-approved protocol surveys.

WSP-1 Seasonal Avoidance: Project construction activities in suitable nesting habitat will occur during the species non-breeding season: the period beginning October 1 and continuing through February 28 of the following year or through February 29 in a leap year.

WSP-2 Use of Handheld Tools Only: Project construction activities in suitable nesting habitat will be limited to the use of handheld tools, including handheld motorized implements such as chain saws and power augers. No heavy equipment will be allowed within suitable nesting habitat.

WSP-3 Guidelines for Handheld Tools: If handheld motorized implements are used, operators will employ best management practices to avoid and minimize soil and water contamination from fuel and lubricants. Measures include:

a. Use spill-resistant fuel and lubricant containers;
b. Consider the use of a portable containment pad for re-fueling in the field;
c. Immediately report petroleum spills to the landowner, or land management agency, and notify appropriate local authorities for advice and action on containment and cleanup of spills; and
d. Clearly mark the location and/or boundaries of the spill site to enable rapid remedial action.

WSP-4 Biological Monitor: If project construction activities occur in adjacent to, but not within suitable nesting habitat, then project activities will be conducted during the species non-breeding season, if possible. If non-breeding season construction is not possible, then the Subapplicant will employ a Service-approved biologist to conduct weekly western snowy plover surveys. If western snowy plovers are observed, the Service-approved biologist will notify the Service within 1 day of the observation and will monitor all construction activities conducted adjacent to western snowy plovers suitable nesting habitat. The qualified biologist will have the right and responsibility to stop work if adverse effects of nesting western snowy plovers are observed.

WSP-5 Flagging: When necessary to minimize the area affected by the project, the Subapplicant or their contractors will mark the work site boundaries with flagging or other visible materials, and remove those markers at the conclusion of the project.

WSP-6 Avoid Placement of Predator Perches: Workers will avoid temporary or permanent placement of structures (e.g., posts, railings, tall equipment, or fence lines) that could provide elevated perches for predatory birds.

WSP-7 Access Restrictions: Access to work sites will be by foot travel only. Motorized vehicles, including all-terrain vehicles, are not permitted on work sites located within suitable nesting habitat.

WSP-8 Site Restrictions: Vehicles used for transport of personnel will be restricted to existing parking lots or roadside parking areas.

WSP-9 Restore Contours of Temporarily Disturbed Areas: At the conclusion of the project, areas temporarily impacted by project activity will be restored to their pre-project condition (for example, footpaths are to be raked to their original ground contour and cut vegetation is to be removed or piled for future disposal).

WSP-10 Waste Management: Trash, food, food containers, and food waste will be secured at all times by individual workers, or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.

WSP-11 Prohibition of Pets Onsite: Pets will be prohibited from all work sites.

Northern Spotted Owl Conservation Measures

The following Conservation Measures are required for Subapplicant's proposed projects and their interrelated and interdependent activities that may affect the northern spotted owl (NSO). These measures are designed to reduce direct and indirect disturbance to individual NSOs, and habitat effects, to an insignificant and discountable level.

NSO-1 Contact the Service for NSO Data Records: If the Subapplicant's proposed project is located within suitable nesting, roosting or foraging habitat (NRF) for the NSO, and may directly or indirectly affect the NSO or its habitat, contact the Service to obtain contact information for local Forest Service, County, or other biologists who can provide NSO survey, Activity Center and habitat suitability data for the Action Area. An Activity Center represents the 'best of detections' such as a nest tree, an area used by roosting pairs or territorial singles, or an area of concentrated nighttime detections. This step will provide baseline information for the Action Area, and will help determine if and where surveys will be done, or if recent surveys have been completed.

NSO-2 Protocol Level Surveys: If NSO surveys have not been done, or are not current per the 2012 NSO Survey Protocol guidance (depending on activity), <u>and surveys are planned,</u> conduct them according to the 2012 NSO Survey Protocol and follow the seasonal restrictions described below for 'Surveyed Landscape'. If surveys are not planned or feasible, assume occupancy based on the presence of suitable NRF habitat; adhere to the guidance and seasonal restrictions described below for operating in an 'Un-surveyed Landscape'.

a. As an option to the full 6-visit protocol surveys described in the 2012 NSO Survey Protocol, three surveys can be conducted in the year of action implementation. If no NSOs are detected within 0.25 mile of the proposed activities, activities may proceed that year without seasonal restrictions.

NSO-3 Work Restrictions in Previously Surveyed Landscape: If surveys are completed or are current for the Action Area (based on surveys conducted by the applicant/project proponent, or other data provided from other agencies):

a. Do not conduct activities that result in loud or continuous noise above ambient levels within 0.25 mile (or 1,320 feet) of a nest site between February 1 and July 9.
    - This includes activities that generate sound levels 20 or more decibels above ambient sound levels <u>or</u> activities that generate maximum sound levels above 90 decibels, excluding vehicle back-up alarms. Maximum sound levels are the combined ambient and activity-generated sound levels.
b. Do not conduct any suitable habitat modification or smoke-generating activities within 0.25 mile (or 1,320 feet) of a nest site between February 1 and September 15.
    - Suitable habitat includes NSO NRF habitat. Modification includes cutting and removal of large trees, down logs or snags. Tree or limb trimming or pruning, brush trimming or removal, and hazard tree felling may occur as long as the noise levels described above are not exceeded during the critical breeding period of February 1-July 9.

NSO-4 Work Restrictions in Previously Un-surveyed Landscape: If surveys have not been completed and cannot be done, assume occupancy in the Action Area/portion of it based on the presence of suitable NRF habitat:

a. Do not conduct activities that result in loud and continuous noise above ambient levels within 0.25 mile (or 1,320 feet) of un-surveyed suitable NRF habitat between February 1 and July 9.
    - This includes activities that generate sound levels 20 or more decibels above ambient sound levels <u>or</u> activities that generate maximum sound levels above 90 decibels, excluding vehicle back-up alarms. Maximum sound levels are the combined ambient and activity-generated sound levels.
b. Do not conduct any suitable habitat modification or smoke-generating activities within 0.25 mile (or 1,320 feet) of un-surveyed suitable NRF habitat between February 1 and September 15.
    - Suitable habitat includes NSO NRF habitat. Modification includes cutting and removal of large trees, down logs or snags. Tree or limb trimming or pruning, brush trimming or removal, and hazard tree felling may occur as long as the noise levels described above are not exceeded during the critical breeding period of February 1-July 9.

NSO-5 Noise Abatement: Equipment must be in good working order with standard noise abatement devices attached.

NSO-6 Habitat Avoidance: Within all suitable NRF habitat:

a. Avoid removing or damaging known nest trees and associated screen trees, unless they are a confirmed safety hazard per the guidance documents from the implementing agency or another agency with jurisdiction in the Action Area.
b. Avoid removing or damaging trees or snags with potential nesting platforms and associated screen trees. These include trees with large flattened tops, large broken topped trees, trees with decadence such as large cavities, mistletoe broom structures, cat faces, or large limbs; or large snags with these similar characteristics.

c. Avoid removing large (20" diameter at breast height or larger) snags, unless they are a confirmed safety hazard per the implementing agency's guidance documents.

NSO-7 Avoid Reducing Habitat Quality: Project activities will not downgrade or remove the function of suitable nesting/roosting habitat to the degree that the habitat does not function in the capacity that existed pre-treatment:

a. While habitat elements may be removed, such as individual large trees or snags if they are a confirmed safety hazard, from nesting/roosting habitat, the treatment must not be so extensive as to downgrade or remove the overall function of the habitat.
b. If the Subapplicant's proposed project removes or downgrade nesting/roosting habitat function, this programmatic biological opinion is not applicable and a separate consultation with the Service is warranted.

NSO-8 Avoid Foraging Habitat: Within suitable foraging habitat in NSO core areas (0.5 mile radius, or 500-acre area, around an Activity Center) and within suitable foraging habitat in NSO home ranges (1.3 mile radius, including core, or 3,398-acre area around an Activity Center):

a. Avoid downgrading or removing suitable foraging habitat function.
b. While habitat elements may be removed, such as individual trees, shrubs, down logs and snags, from foraging habitat, the treatment must not be so extensive as to downgrade or remove the overall function of the habitat in an NSO core or home range below the recommended habitat levels for supporting survival, reproduction and occupancy (USDI-FWS 2009). This level is a combination of 400 acres of suitable NRF habitat in the core. For the home range, the level is 40 percent suitable NRF (approximately 1,336 acres).
c. If the Subapplicant's proposed project removes or downgrades suitable foraging habitat function in a core and home range to below the recommended levels, this programmatic biological opinion is not applicable and a separate consultation with the Service is warranted.

NSO-9 Work Restrictions in NSO Critical Habitat: When working in designated critical habitat, adhere to all measures described in NSO-6, NSO-7, and NSO-8 for reducing impacts in suitable nesting/roosting and foraging habitat. This will assure that effects to Physical and Biological Features (PBFs) of PBF-2 (nesting/roosting) and PBF-3 (foraging) are insignificant and discountable. Adhering to these Conservation Measures (NSO-6, NSO-7, and NSO-8 above) will also assure that effects to PBF-1 and PBF-4 are insignificant and discountable, given the larger scale at which effects to these critical habitat PBFs are to be considered under the 2012 Revised Critical Habitat final rule (77 FR 71876). PBF-1 refers to forest types that may be in early, mid, or late seral stages and that support the NSO across its geographical range. PBF-4 refers to habitat that supports the transience and colonization phases of dispersal.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." For the proposed project, the Action Area encompasses the entire jurisdiction of the Sacramento Fish and Wildlife Office, which encompasses all or parts of 40 counties. (https://www.fws.gov/sacramento/GIS_resources/Maps/Images/sacramento_jurisdiction.jpg)

Analytical Framework for the Jeopardy Determinations

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

The jeopardy analysis in this programmatic biological opinion considers the effects of the proposed federal action, and any cumulative effects, on the range wide survival and recovery of the listed species. It relies on four components: (1) the Status of the Species, which describes the range-wide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which analyzes the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed federal action and the effects of any interrelated or interdependent activities on the species; and (4) the Cumulative Effects, which evaluates the effects of future, non-federal activities in the action area on the species.

In accordance with the implementing regulations for Section 7 and Service policy, the jeopardy determination is made in the following manner: the effects of the proposed federal action are evaluated in the context of the aggregate effects of all factors that have contributed to the current status of 42 species. Additionally, for non-Federal activities in the action area, we will evaluate those actions likely to affect the species in the future, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both its survival and recovery in the wild.

The following analysis places an emphasis on using the range-wide survival and recovery needs of the these species, and the role of the action area in providing for those needs as the context for evaluating the significance of the effects of the proposed programmatic Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Analytical Framework Adverse Modification

Section 7(a)(2) of the Act requires that federal agencies insure that any action they authorize, fund, or carry out is not likely to destroy or adversely modify designated critical habitat. A final rule revising the regulatory definition of "destruction or adverse modification" (DAM) was published on February 11, 2016 (81 FR 7214). The final rule became effective on March 14, 2016. The revised definition states:

> "Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features."

The DAM analysis in this biological opinion relies on four components: (1) the Status of Critical Habitat, which describes the range-wide condition of the critical habitat in terms of the key components (i.e., essential habitat features, primary constituent elements, or physical and biological

features) that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the listed species; (2) the Environmental Baseline, which analyzes the condition of the critical habitat in the action area, the factors responsible for that condition, and the value of the critical habitat in the action area for the conservation/recovery of the listed species; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed federal action and the effects of any interrelated and interdependent activities on the key components of critical habitat that provide for the conservation of the listed species, and how those impacts are likely to influence the conservation value of the affected critical habitat; and (4) Cumulative Effects, which evaluate the effects of future non-federal activities that are reasonably certain to occur in the action area on the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the conservation value of the affected critical habitat.

For purposes of making the DAM determination, the Service evaluates if the effects of the proposed federal action, taken together with cumulative effects, are likely to impair or preclude the capacity of critical habitat in the action area to serve its intended conservation function to an extent that appreciably diminishes the range wide value of critical habitat for the conservation of the listed species. The key to making that finding is understanding the value (i.e., the role) of the critical habitat in the action area for the conservation/recovery of the listed species based on the *Environmental Baseline* analysis.

Environmental Baseline and Status of the Species

Depending on the intensity of a disaster, it is possible for habitat areas directly impacted by disasters to be completely destroyed and landscapes to be severely altered. Additionally, during response and recovery efforts, areas outside of or undisturbed by a disaster may be affected due to the construction of new facilities, the relocation of existing facilities (e.g., schools or hospitals), or relocating the function of existing facilities. Therefore, the environmental baseline for the Action Area cannot be defined at this time.

California Red-Legged Frog

Listing Status

The California red-legged frog was listed as a threatened species on May 23, 1996 (Service 1996). Critical habitat was designated for this species on April 13, 2006 (Service 2006), with revisions to the critical habitat designation published on March 17, 2010 (Service 2010). At that time, the Service recognized the taxonomic change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer et al. 2010). A recovery plan was published for the California red-legged frog on September 12, 2002 (Service 2002).

Description

The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949), ranging from 1.5 to 5.1 inches in length (Stebbins 2003). The abdomen and hind legs of adults are largely red, while the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color. Dorsal spots usually have light centers (Stebbins 2003); dorsolateral folds are prominent on the back. The California red-legged frog is sexually dimorphic; the females are larger than the males (Dodd 2013a, b). California red-legged frog tadpoles range from 0.6 inch to 3.1 inches in length and the

background color of the body is dark brown and yellow with darker spots (Storer 1925).

Current Status and Distribution

The historical range of the California red-legged frog extended from central Mendocino County and western Tehama County south in the California Coast Range to northern Baja California, Mexico, and in the Sierra Nevada/Cascade Ranges from Shasta County south to Madera County (Jennings and Hayes 1994). The species historically occurred from sea level to elevations of about 5,200 feet in 46 counties; however, currently the taxon is extant in 238 streams or drainages within only 22 counties, representing a loss of 70 percent of its former range (Service 2002). Isolated populations persist in several Sierra Nevada foothill locales and in Riverside County (Barry and Fellers 2013; Backlin et al. 2017; CDFW 2017; Gordon, R. and J. Bennett, pers. comm., 2017). The species is no longer considered extant in California's Central Valley due to significant declines caused by habitat modifications and exotic species (Fisher and Shaffer 1996). Currently, the California red-legged frog is widespread in the San Francisco Bay nine-county area (CDFW 2017). They are still locally abundant within the California coastal counties from Mendocino County to Los Angeles County and presumed extirpated in Orange and San Diego counties (CDFW 2017; Yang, D. and J. Martin, pers. comm., 2017; Gordon, R. and J. Bennett, pers. comm., 2017). Baja California represents the southernmost edge of the species' current range (Peralta-García et al. 2016).

Barry and Fellers (2013) conducted a comprehensive study to determine the current range of the California red-legged frog in the Sierra Nevada, concluding that it differs little from its historical range; however, the current Sierra Nevada populations appear to be small and tend to fluctuate. Since 1991, eleven California red-legged frog populations have been discovered or confirmed, including eight probable breeding populations (Barry and Fellers 2013; Mabe, J., pers. comm., 2017). Microsatellite and mitochondrial DNA analysis by Richmond et al. (2014) confirmed the Sierra Nevada populations of the California red-legged frog are genetically distinct from each other, as well as from other populations throughout the range of this species. The research concluded that the Sierra Nevada populations are persisting at low levels of genetic diversity and no contemporary gene flow across populations exist. On a larger geographic scale, range contraction has left a substantial gap between Sierra Nevada and Coast Range populations, similar to the gap separating the Southern California and Baja California populations (Richmond et al. 2014).

Habitat and Life History

Habitat: The California red-legged frog generally breeds in still or slow-moving water associated with emergent vegetation, such as cattails, tules (hardstem bulrush), or overhanging willows (Storer 1925; Fellers 2005). Aquatic breeding habitat predominantly includes permanent water sources such as streams, marshes, and natural and manmade ponds in valley bottoms and foothills (Jennings and Hayes 1994; Bulger et al. 2003; Stebbins 2003). Since the 1850's, manmade ponds may actually supplement stream pool breeding habit and can be capable of supporting large populations of this species. Breeding sites may hold water only seasonally, but sufficient water must persist at the beginning of the breeding season and into late summer or early fall for tadpoles to successfully complete metamorphosis. Breeding habitat does not include deep lacustrine water habitat (e.g., deep lakes and reservoirs 50 acres or larger in size) (Service 2010). Within the coastal lagoon habitats, salinity is a significant factor on embryonic mortality or abnormalities (Jennings and Hayes 1990). Jennings and Hayes (1990) conducted laboratory studies and field observations concluding salinity levels above 4.5 parts per thousand detrimentally affected the California red-legged frog embryos. Aquatic breeding habitat does not need to be available every year, but it must be available at least once within the frog's lifespan for breeding to occur (Service 2010).

Non-breeding aquatic habitat consists of shallow (non-lacustrine) freshwater features not suitable as breeding habitat, such as seasonal streams, small seeps, springs, and ponds that dry too quickly to support breeding. Non-breeding aquatic and riparian habitat is essential for providing the space, food, and cover necessary to sustain the California red-legged frog. Riparian habitat consists of vegetation growing nearby, but not typically in, a body of water on which it depends, and usually extends from the bank of a pond or stream to the margins of the associated floodplain (Service 2010). Adult California red-legged frogs may avoid coastal habitat with salinity levels greater than 6.5 parts per thousand (Jennings and Hayes 1990).

Cover and refugia are important habitat characteristic preferences for the species (Halstead and Kleeman 2017). Refugia may include vegetation, organic debris, animal burrows, boulders, rocks, logjams, industrial debris, or any other object that provides cover. Agricultural features such as watering troughs, spring boxes, abandoned sheds, or haystacks may also be utilized by the species. Incised stream channels with portions narrower and depths greater than 18 inches may also provide important summer sheltering habitat. During periods of high water flow, California red-legged frogs are rarely observed; individuals may seek refuge from high flows in pockets or small mammal burrows beneath banks stabilized by shrubby riparian growth (Jennings and Hayes 1994). Accessibility to cover habitat is essential for the survival of California red-legged frogs within a watershed and can be a factor limiting frog population numbers and survival.

Breeding: The California red-legged frog typically breeds between November and April; however, breeding may occur later in the Sierra Nevada Range (Barry 2002). Females deposit their egg masses on emergent vegetation, floating on or near the surface of the water. The California red-legged frog is often a prolific breeder, laying eggs during or shortly after large rainfall events in late winter and early spring. Egg masses containing 300-4,000 eggs hatch after six to fourteen days (Storer 1925; Jennings and Hayes 1994; Fellers 2005). Historically, the California red-legged frog in the Sierra Nevada likely bred within stream pools, which tend to be small with limited forage, constraining the size and number of populations (Barry and Fellers 2013).

California red-legged frog tadpoles undergo metamorphosis three to seven months following hatching. Most males reach sexual maturity in two years, while it takes approximately three years for females (Jennings and Hayes 1985; Fellers 2005). Under favorable conditions, California red-legged frogs may live eight to ten years (Jennings et al. 1992). Of the various life stages, tadpoles likely experience the highest mortality rates; only one percent of each egg mass completes metamorphosis (Jennings et al. 1992).

Diet: The California red-legged frog has a variable diet that changes with each of its life history stages. The feeding habits of the early stages are likely similar to other ranids, whose tadpoles feed on algae, diatoms, and detritus by grazing on the surface of rocks and vegetation (Fellers 2005). Hayes and Tennant (1985) found invertebrates to be the most common food items of adult California red-legged frogs collected in southern California; however, they speculated that this was opportunistic and varied based on prey availability. Vertebrates, such as Pacific tree frogs (*Hyla regilla*) and California mice (*Peromyscus californicus*), represented over half of the prey mass eaten by larger frogs, although invertebrates were the most numerous food items. Feeding typically occurs along the shoreline and on the surface of the water; juveniles appear to forage during both daytime and nighttime, whereas adults appear to feed at night (Hayes and Tennant 1985).

Movement: California red-legged frogs do not have a distinct breeding migration (Fellers 2005), rather they may move seasonally from non-breeding pools or refugia to breeding pools. Some individuals

remain at breeding sites year-round while others disperse to neighboring water features or moist upland sites when breeding is complete and/or when breeding pools dry (Service 2002; Bulger et al. 2003; Fellers and Kleeman 2007; Tatarian and Tatarian 2008; Tatarian 2008). Studies in the several San Francisco Bay counties showed movements are typically along riparian corridors (Fellers and Kleeman 2007; Tatarian 2008). Although, some individuals, especially on rainy nights and in more mesic areas, travel without apparent regard to topography, vegetation type, or riparian corridors, and can move directly from one site to another through normally inhospitable habitats such as heavily grazed pastures or oak-grassland savannas (Bulger et al 2003).

California red-legged frogs show high site fidelity (Tatarian and Tatarian 2008) and typically do not move significant distances from breeding sites (Bulger et al. 2003; Fellers and Kleeman 2007; Tatarian and Tatarian 2008; Tatarian 2008). When traveling between aquatic sites, California red-legged frogs typically travel less than 0.31 miles (Fellers and Kleeman 2007; Tatarian and Tatarian 2008), although they have been documented to move more than two miles in Santa Cruz County (Bulger et al. 2003). Various studies have found that the frogs typically do not make terrestrial forays further than 200 feet from aquatic habitat (Bulger et al. 2003; Fellers and Kleeman 2007; Tatarian and Tatarian 2008; Tatarian 2008). Upland movements are typically associated with precipitation events and usually last for one to four days (Tatarian 2008).

Threats

Factors associated with declining populations of the California red-legged frog throughout its range include degradation and loss of habitat through agriculture, urbanization, mining, overgrazing, recreation, timber harvesting, non-native species, impoundments, water diversions, erosion and siltation altering upland and aquatic habitat, degraded water quality, use of pesticides, and introduced predators (Service 2002, 2010). Urbanization often leaves isolated habitat fragments and creates barriers to frog dispersal.

Non-native species pose a major threat to the recovery of California red-legged frogs. Several researchers have noted the decline and eventual local disappearance of California and northern red-legged frogs in systems supporting bullfrogs (Jennings and Hayes 1990; Twedt 1993), red swamp crayfish, signal crayfish, and several species of warm water fish including sunfish, goldfish, common carp, and mosquitofish (Moyle 1976; Barry 1992; Hunt 1993; Fisher and Shaffer 1996). The decline of the California red-legged frog due to these non-native species has been attributed to predation, competition, and reproduction interference (Twedt 1993; Bury and Whelan 1984; Storer 1933; Emlen 1977; Kruse and Francis 1977; Jennings and Hays 1990; Jennings 1993).

Chytridiomycosis, an infectious disease caused by the chytrid fungus, *Batrachochytrium dendrobatidis* (*Bd*), has been found to adversely affect amphibians globally (Davidson et al. 2003; Lips et al. 2006). While *Bd* prevalence in wild amphibian populations in California is unknown (Fellers et al. 2011), chytrid is expected to be widespread throughout much of the California red-legged frog's range. The chytrid fungus has been documented within the California red-legged frog populations at Point Reyes National Seashore, two properties in Santa Clara County, Yosemite National Park, Hughes Pond, Sailor Flat, Big Gun Diggings, and Spivey Pond (Padgett-Flohr and Hopkins 2010; Tatarian and Tatarian 2010; Fellers et al. 2011; Barry and Fellers 2013). However, no chytrid-related mortality has been reported in these populations, suggesting that California red-legged frogs are less vulnerable to the pathogenic effects of chytrid infection than other amphibian species (Tatarian and Tatarian 2010; Barry and Fellers 2013; Fellers et al. 2017). While chytrid infection may not directly lead to mortality in California red-legged frogs, Padgett-Flohr (2008) states that this infection may reduce overall fitness and could lead to long-term effects. Therefore, it is difficult to estimate the

full extent and risk of chytridiomycosis to the California red-legged frog populations.

Recovery Plan

The Recovery Plan for the California red-legged frog identifies eight recovery units (Service 2002). Based on various regional areas of the species' range, the establishment of these recovery units are essential to its survival and recovery. The goal of the recovery plan is to protect the long-term viability of all extant populations within each recovery unit. Within each recovery unit, delineated core areas, designed to protect metapopulations, represent contiguous areas of moderate to high California red-legged frog densities. The management strategy identified within this Recovery Plan will allow for the recolonization of habitats within and adjacent to core areas naturally subjected to periodic localized extinctions, thus assuring the long-term survival and recovery of California red-legged frogs.

Critical Habitat

The Service designated critical habitat for the California red-legged frog on March 13, 2001 (Service 2001a) and a revised designation to the critical habitat was published on April 13, 2006 (Service 2006b) and again on March 17, 2010 (Service 2010). At this time, the Service recognized the taxonomic change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer *et al.* 2010). The rule identifies approximately 1,636,609 acres within 48 critical habitat units in Alameda, Butte, Calaveras, Contra Costa, El Dorado, Kern, Kings, Los Angeles, Marin, Mendocino, Merced, Monterey, Napa, Nevada, Placer, San Benito, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Cruz, Solano, Sonoma, Stanislaus, Ventura, and Yuba Counties, California.

The physical and biological features (PBFs) defined for the California red-legged frog were derived from its biological needs. The area designated as revised critical habitat provides aquatic habitat for breeding and non-breeding activities and upland habitat for shelter, foraging, predator avoidance, and dispersal across its range. The PBFs and, therefore, the resulting physical and biological features essential for the conservation of the species were determined from studies of California red-legged frog ecology. Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the Service determined that the PBFs essential to the conservation of the California red-legged frog are:

> PBF 1 Aquatic Breeding: Habitat Standing bodies of fresh water (with salinities less than 7.0 parts per thousand), including: natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years;
>
> PBF 2 Non-Breeding Aquatic Habitat: Freshwater and wetted riparian habitats, as described above, that may not hold water long enough for the subspecies to hatch and complete its aquatic life cycle but that do provide for shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult California red-legged frogs. Other wetland habitats considered to meet these elements include, but are not limited to: plunge pools within intermittent creeks; seeps; quiet water refugia during high water flows; and springs of sufficient flow to withstand the summer dry period.

PBF 3 Upland Habitat: Upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat up to a distance of one mile in most cases and comprised of various vegetation series such as grasslands, woodlands, wetland, or riparian plant species that provide the frog shelter, forage, and predator avoidance. Upland features are also essential in that they are needed to maintain the hydrologic, geographic, topographic, ecological, and edaphic features that support and surround the wetland or riparian habitat. These upland features contribute to the filling and drying of the wetland or riparian habitat and are responsible for maintaining suitable periods of pool inundation for larval frogs and their food sources, and provide breeding, non-breeding, feeding, and sheltering habitat for juvenile and adult frogs (e.g., shelter, shade, moisture, cooler temperatures, a prey base, foraging opportunities, and areas for predator avoidance). Upland habitat should include structural features such as boulders, rocks and organic debris (e.g., downed trees, logs), as well as small mammal burrows and moist leaf litter; and

PBF 4: Dispersal Habitat: Accessible upland or riparian dispersal habitat within designated units and between occupied locations within a minimum of 1 mile of each other that allow for movement between such sites. Dispersal habitat includes various natural habitats and altered habitats such as agricultural fields, which do not contain barriers (e.g., heavily traveled road without bridges or culverts) to dispersal. Dispersal habitat does not include moderate- to high-density urban or industrial developments with large expanses of asphalt or concrete, nor does it include large reservoirs over 50 acres in size, or other areas that do not contain those features identified in PBFs 1, 2, or 3 as essential to the conservation of the subspecies.

With the revised designation of critical habitat, the Service intends to conserve the geographic areas containing the physical and biological features that are essential to the conservation of the species, through the identification of the appropriate quantity and spatial arrangement of the PBFs sufficient to support the life-history functions of the species.

Based on the documented presence of this species in the Action Area, and the biology and ecology of this species, the Service has determined that the California red-legged frog is likely to be present in the Action Area and use this area for breeding, sheltering, foraging, and dispersal.

California Tiger Salamander Central Distinct Population Segment

The central California tiger salamander occurs or has the potential to occur within the Action Area in Alameda, Amador, Calaveras, Contra Costa, Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, Sacramento, San Benito, San Mateo, San Joaquin, San Luis Obispo, Santa Clara, Santa Cruz, Stanislaus, Solano, Tulare, Tuolumne, and Yolo Counties (Service 2017b). The CNDDB (2018) lists 1,177 occurrences throughout its range. The central California tiger salamander occurs at sites on the Central Valley floor near sea level, up to a maximum elevation of roughly 3,940 feet (1,200 meters) in the Coast Ranges and 1,640 feet (500 meters) in the Sierra Nevada foothills Shaffer et al. 2013). Central California tiger salamanders are adapted to breeding in natural vernal pools and ponds; however, they now frequently use livestock ponds and other modified ephemeral and permanent ponds (Service 2014a). Upland habitats surrounding known central California tiger salamander breeding pools are usually dominated by grassland, oak savanna, or oak woodland (CNDDB 2015). The species requires upland habitat that is occupied by small burrowing mammals such as California ground squirrel (*Otospermophilus beecheyi*) and Botta's pocket gopher (*Thommomys bottae*) that create underground burrow systems used by the salamanders throughout the year (Shaffer et al. 1993; Seymour and Westphal 1994; Loredo et al. 1996; Pittman 2005). Large tracts of upland habitat, preferably with multiple breeding ponds, are necessary for the Central California tiger salamander to persist.

Multiple factors have contributed to population declines of the central California tiger salamander, including habitat loss and fragmentation due to agriculture and urbanization; predation from and competition with invasive species; hybridization with non-native barred tiger salamanders (*Ambystoma tigrinum*) (sometimes referred to as *Ambystoma tigrinum mavortium*) (Fitzpatrick and Shaffer 2004; Riley *et al.* 2003); mortality from road crossings; contaminants; and small mammal burrow control efforts (Service 2004, 2014a). Other threats include disease, predation, interspecific competition, exposure to contaminants, and rodent and mosquito control (Service 2004, 2014a).

The Recovery Plan for the Central California tiger salamander (Service 2017a) identifies four recovery units: Central Valley, Southern San Joaquin Valley, Bay Area and Central Coast Range. The Action Area includes all recovery units and occurrences. While there have been continued losses of central California tiger salamander habitat, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander (*Ambystoma californiense*) (Service 2017a).

Critical Habitat

The Service designated critical habitat for the Central California tiger salamander on September 22, 2005 (Service 2005b). The rule identifies approximately 199,109 acres within 32 critical habitat units in Alameda, Amador, Calaveras, Contra Costa, Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, Sacramento, San Benito, San Joaquin, San Luis Obispo, Santa Clara, Solano, Stanislaus, Tulare, and Yolo Counties, California.

The PBFs defined for the Central California tiger salamander were derived from its biological needs. The area designated as revised critical habitat provides aquatic habitat for breeding and non-breeding activities and upland habitat for shelter, foraging, predator avoidance, and dispersal across its range. The PBFs and, therefore, the resulting physical and biological features essential for the conservation of the species were determined from studies of California tiger salamander ecology. Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the Service determined that the PBFs essential to the conservation of the Central California tiger salamander are:

> PBF 1 Aquatic Breeding Habitat: Standing bodies of fresh water (including natural and manmade (e.g., stock)) ponds, vernal pools, and other ephemeral or permanent water bodies which typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall;
>
> PBF 2 Upland Habitat Upland: habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground habitat that Central California tiger salamanders depend upon for food, shelter, and protection from the elements and predation; and
>
> PBF 3 Dispersal Habitat: Accessible upland dispersal habitat between occupied locations that allow for movement between such sites.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the central California tiger salamander occurs within the Action Area.

California Tiger Salamander Sonoma Distinct Population Segment

The Sonoma California tiger salamander occurs or has the potential to occur within the Action Area, in Sonoma County. The CNDDB (2018) lists 81 currently known occurrences within Sonoma County. The Sonoma County California tiger salamander inhabits vernal pools and seasonal ponds, associated grassland, and oak savannah plant communities below 200 feet (60 meters) (Service 2003a). They also use modified ephemeral or permanent ponds and manmade features such as constructed ponds or livestock ponds (Service 2016). Sonoma County California tiger salamanders spend the majority of their lives underground in small mammal burrows in uplands, while ephemeral ponds play a critical role because they are necessary for breeding. As with the Central California tiger salamander, large tracts of upland habitat, preferably with multiple breeding ponds, are necessary for the Sonoma tiger salamander to persist (Service 2016).

The primary threats the Sonoma County California tiger salamander are the modification and destruction of suitable habitat due to urbanization, agricultural conversion, and competition with non-native plants. In addition to habitat loss, the fragmented condition of remaining Sonoma County California tiger salamander habitat restricts migration between aquatic breeding sites and upland non-breeding habitat, along with dispersal among aquatic breeding sites (Cook *et al.* 2005). Since 1991, these threats have continued to such an extent that many populations appear to have been extirpated or severely reduced in numbers.

The Recovery Plan for the Santa Rosa Plains (Service 2016) identifies three core areas for the Sonoma County California tiger salamander (Wright-Kelly Core Area, Llano Crescent-Stony Point Core Area, and West Cotati Core Area) and four bounded management areas (the Alton Lane, Horn-Hunter, Americano-Stemple, and East Cotati Management Areas). The Action Area includes all occurrences and core areas. While there have been continued losses of Central California tiger salamander habitat, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the range-wide status of this plant species, please refer to the Recovery Plan for the Santa Rosa Plains (Service 2016).

Critical Habitat

The Service designated critical habitat for the Sonoma California tiger salamander on December 14, 2005 (Service 2005c) and a revised designation to the critical habitat was published on August 31, 2011 (Service 2011a). The rule identifies approximately 47,383 acres within one critical habitat unit in Sonoma County, California.

Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the Service determined that the following PBFs are essential to the conservation of the Sonoma County California tiger salamander:

> PBF 1 Aquatic Breeding Habitat: standing bodies of fresh water (including natural and manmade (e.g., stock) ponds, vernal pools and other ephemeral or permanent water bodies that typically support inundation during winter/early spring and hold water for a minimum of 12

consecutive weeks in a year of average rainfall);

PBF 2 Upland Habitat: upland habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground refugia that Sonoma County California tiger salamanders depend upon for food, shelter, and protection from the elements and predation; and

PBF 3 Dispersal Habitat: accessible upland dispersal habitat between occupied locations that allow for movement between such sites.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the Sonoma California tiger salamander occurs within the Action Area.

Giant Garter Snake

The giant garter snake occurs or has the potential to occur within the Action Area in Sacramento and San Joaquin Valleys. The giant garter snake is endemic to the wetlands of the Sacramento and San Joaquin Valleys of California. The CNDDB (2018) lists 366 occurrences of the species in Amador, Butte, Colusa, Contra Costa, Fresno, Glenn, Kern, Madera, Merced, Sacramento, San Joaquin, Solano, Sutter, Yolo, and Yuba Counties. The giant garter snake now inhabits the remaining high-quality fragmented wetlands that include marshes, ponds, small lakes, low-gradient streams with silt substrates, and managed waterways (Service 2017a). Giant garter snakes typically occur in or adjacent to aquatic habitats possessing protective emergent vegetative cover that allow for foraging. Upland areas are also an important habitat component; the giant garter snake spends half of the year, roughly November through April, hibernating in uplands. The snake also is known to spend more than half the time in terrestrial environments during the active period during summer (Halstead et al. 2015b). While in such terrestrial habitats in summer, the snake is often underground, especially during extreme temperatures. Animal burrows are considered an important component of upland refugia, although other elements such as brush piles and even riprap may be used (e.g., Wylie and Amarello 2008). Although snakes can venture as much as 500 feet or more from the water edge, the overwhelming majority of both the summer and winter upland captures are within the first 10 meters from the water edge.

Threats to giant garter snake include habitat loss from urbanization, the subsequent fragmentation and population isolation, flood channel maintenance, agricultural practices (e.g., rice fallowing due to drought conditions, habitat disturbance and loss from irrigation and drainage ditch maintenance), climate change, water transfers, and invasive species. Habitat fragmentation restricts dispersal and isolates giant garter snake populations, increasing the likelihood of inbreeding, decreasing fitness, and reducing genetic diversity. These factors have ultimately resulted in the snake's extirpation from the southern one-third of its range in former wetlands associated with the historical Buena Vista, Tulare, and Kern lakebeds. In addition to habitat loss, the remaining Central Valley populations of the giant garter snake are subject to the cumulative effects of a number of other existing and potential threats, including roads and vehicular traffic, climate change, and predation by non-native species.

The Recovery Plan (Service 2017a) for the giant garter snake identifies nine recovery units that correspond directly to the nine geographically and genetically distinct populations: Butte Basin, Colusa Basin, Sutter Basin, American Basin, Yolo Basin, Delta Basin, Cosumnes-Mokelumne Basin, San Joaquin Basin, and Tulare Basin. The Action Area includes all recovery units and occurrences.

While there have been continued losses of giant garter snake habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Recovery Plan for the Giant Garter Snake *(Thamnophis gigas)* (Service 2017a).

Critical Habitat

Critical habitat has not been designated for the giant garter snake.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the giant garter snake occurs within the Action Area.

Alameda Whipsnake

The Alameda whipsnake occurs or has the potential to occur within the Action Area in Alameda, Contra Costa, western San Joaquin, northern Santa Clara, and northwestern Stanislaus Counties. The CNDDB (2018) lists 164 occurrences for Alameda whipsnake, the majority of which are in the Mount Diablo State Park and Los Vaqueros Watershed specifically, and on various East Bay Regional Park land. The current distribution is five populations within a fragmented regional metapopulation (Service 2002b). General habitat types of Alameda whipsnake include chaparral and coastal scrub, and associated native vegetation and rock land up to 500 feet (150 meters) from chaparral and coastal scrub (Service 2011e). While the Alameda whipsnake uses all slope aspects and brush community canopy closures, Swaim (1994) found areas of concentrated use on southwest-, south-, southeast-, east-, or northeast-facing slopes at both the Tilden Regional Park and the Moller Ranch.

Habitat loss and fragmentation are the primary threats to the Alameda whipsnake. Habitat loss and fragmentation from urban development, associated impacts due to increased population densities and associated highway and road construction likely has prevented or severely reduced movement of individuals between areas of suitable habitat, and exacerbated impacts of other threats. Urban development has also reduced the total amount of suitable habitat available for the Alameda whipsnake. Other current threats to the habitat of the Alameda whipsnake are incompatible grazing practices; spread of nonnative plants; increased predation from native and nonnative predators associated with urbanization; unauthorized collection; and alteration of suitable habitat from fire suppression, which creates closed-canopy habitat and increases fire severity.

The Draft Recovery Plan for the Alameda whipsnake (Service 2002b) identifies seven Recovery Units: Unit 1 (Tilden-Briones), Unit 2 (Oakland-Las Trampas), Unit 3 (Hayward-Pleasanton Ridge), Unit 4 (Mount Diablo-Black Hills), Unit 5 (Sunol-Cedar Mountain), Unit 6 (Caldecott Tunnel Corridor) and Unit 7 (Niles Canyon/Sunol Corridor). The Action Area includes all recovery units and occurrences. While there have been continued losses of Alameda whipsnake habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Alameda Whipsnake (*Masticophis lateralis euryxanthus*) 5-year Review: Summary and Evaluation (Service 2011e). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

On October 2, 2006, the Service published the final rule determining critical habitat for the Alameda whipsnake in the Federal Register (Service 2006c). The rule designates approximately 154,834 acres within six critical habitat units in Alameda, Contra Costa, Santa Clara, and San Joaquin counties, California.

Based on our current knowledge of the life history, biology, and ecology of the Alameda whipsnake and the requirements of the habitat necessary to sustain the essential life history functions of the subspecies, the Service has determined that the PBFs for the Alameda whipsnake are:

> PBF 1: Scrub/shrub communities with a mosaic of open and closed canopy. Scrub/shrub vegetation dominated by low-to medium-stature woody shrubs with a mosaic of open and closed canopy as characterized by the chamise, chamise-eastwood manzanita, chaparral whitethorn, and interior live oak shrub vegetation series (as identified in the Manual of California Vegetation (Sawyer and Keeler-Wolf 1995), A Guide to Wildlife Habitats of California (Mayer and Laudenslayer 1988), and California Wildlife Habitat Relationship System (CDFG 1998)), occurring at elevations from sea level to approximately 3,850 feet. Such scrub/ shrub vegetation within these series forms a pattern of open and closed canopy used by the Alameda whipsnake for shelter from predators; temperature regulation because it provides sunny and shady locations; prey-viewing opportunities; and nesting habitat and substrate. These features contribute to support a prey base consisting of western fence lizards and other prey species such as skinks, frogs, snakes, and buds;
>
> PBF 2: Woodland or annual grassland plant communities contiguous to lands that contain PBF 1. Woodland or annual grassland vegetation series comprised of one or more of the following: blue oak, coast live oak, California bay, California buckeye, and California annual grassland vegetation series (as identified in the Manual of California Vegetation (Sawyer and Keeler-Wolf 1995), A Guide to Wildlife Habitats of California ((Mayer and Laudenslayer 1988), and California Wildlife Habitat Relationship System (CDFG 1998)) are PBF 2. This mosaic of vegetation is essential to the conservation of the Alameda whipsnake because it supports a prey base, consisting of western fence lizards and other prey species such as skinks, frogs, snakes, and buds. This provides opportunities for foraging by allowing snakes to come in contact with and visualize, track, and capture prey (especially western fence lizards along with other prey such as skinks, frogs, buds); short and long distance dispersal within, between, or to adjacent areas containing essential features (i.e., PBF 1 or PBF 3); and contact with other Alameda whipsnakes for mating and reproduction; and
>
> PBF 3: Lands containing rock outcrops, talus, and small mammal burrows within or adjacent to PBF 1 and or PBF 2. These areas are essential to the conservation of the Alameda whipsnake because they are used for retreats (shelter), hibernacula, foraging and dispersal, and provide additional prey population support functions. Refer to the final designation of critical habitat for additional information.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the Alameda whipsnake occurs within the Action Area.

Least Bell's Vireo

The least Bell's vireo occurs or has the potential to occur within the Action Area in Sacramento, San Joaquin, Santa Clara, Tulare, Kern, Inyo, Yolo and Stanislaus Counties. The CNDDB (2018) lists 483 occurrences for the species. Least Bell's vireos are obligate riparian breeders, inhabiting structurally diverse woodlands along watercourses. They occur in a diversity of riparian habitat types including cottonwood-willow woodlands/forests, oaks woodlands, and mule fat scrub. (Service 1998d).

Threats to the least Bell's vireo include riparian habitat loss from agricultural, urban, and commercial developments, flood control and river channelization projects, livestock grazing and other activities, which have severely restricted the species' range and fragmented remaining habitat. Because of widespread riparian habitat losses, remaining breeding birds are segregated into small, disjunct and widely dispersed remnant populations, making them more vulnerable to extirpation than larger populations are (Franzreb 1989). When local habitats are lost and no nearby habitat is available for dispersal until damaged riparian habitat regenerates, vireos may be forced into habitats less suitable to their nesting and foraging requirements. This could resulting in increased mortality, reduced reproductive success, and declining population numbers (Franzreb 1989). Vireos also suffer from limited reproductive success as the result of nest parasitism by the brown-headed cowbird *(Molothrus ater),* which combined with habitat loss has resulted in a decline in the overall vireo population to about 300 breeding pairs.

The Draft Recovery Plan for the least Bell's vireo (Service 1998d) does not identify Recovery Units. However, it identifies population/metapopulation units needed for recovery. These include the San Joaquin Valley and the Sacramento Valley. The Action Area includes all occurrences and units. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Least Bell's Vireo (*Vireo bellii pusillus*) 5-year Review: Summary and Evaluation (Service 2006d). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

The Service designated critical habitat for the least Bell's vireo on February 2, 1994 (Service 1994). This rule identifies 38,000 acres within 10 critical habitat units in Los Angeles, Riverside, San Bernardino, San Diego, Santa Barbara, and Ventura Counties, California. No units are within the Action Area for the Sacramento Fish and Wildlife Office.

The PBFs of critical habitat for the least Bell's vireo are the riverine and floodplain habitats (particularly willow-dominated riparian woodland with dense understory vegetation maintained, in part, in a non-climax stage by periodic floods or other agents) and adjacent coastal sage scrub, chaparral, or other upland plant communities. Vireos meet their survival and reproductive needs (food, cover, nest sites, and nestling and fledgling protection) within the riparian zone in most areas. In some areas they also forage in adjacent upland habitats.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the least Bell's vireo occurs within the Action Area.

Tidewater Goby

The tidewater goby *(Eucyclogobius newberryi*), occurs within the Action Area in Sonoma, Marin, Alameda, Contra Costa, San Francisco and San Mateo Counties. The CNDDB (2018) lists 127

occurrences. The geographic range of the tidewater goby is limited to the coast of California (Eschmeyer *et al.* 1983, p. 262; Swift *et al.* 1989, p. 12) where it inhabits discrete locations of brackish water along the California coast. Tidewater goby localities closely correspond to major stream drainages (Swift et al. 1989; Habel and Armstrong 1977) where they generally select habitat in the upper estuary, usually within the fresh-saltwater interface. Tidewater gobies range upstream a short distance into fresh water, and downstream into water of up to about 75 percent sea water (28 parts per thousand). The species is typically found in salinities of less than 12 parts per thousand (Swift et al. 1989). These conditions occur in two relatively distinct situations: 1) the upper edge of tidal bays, such as Tomales, Bolinas, and San Francisco Bays near the entrance of freshwater tributaries and 2) the coastal lagoons formed at the mouths of coastal rivers, streams, or seasonally wet canyons.

Threats to the tidewater goby include loss of wetland and associated habitat due to development along the coast. These include wetland draining and filling for industrial and residential development; dredging to develop navigation channels, harbors, and marinas; hydrologic changes such as water diversion and related changes in salinity, groundwater overdrafting, channelization, and sand bar breaching (Service 2005d).

The Recovery Plan for the Tidewater Goby (Service 2005d) identifies one Recovery Unit, the Greater Bay Unit, within the Sacramento Fish and Wildlife Office jurisdiction. The Action Area includes all occurrences and this recovery unit. For the most recent comprehensive assessment of the species' range-wide status, please refer to the 12 month Finding and Proposed Rule to Reclassify the Tidewater Goby from Endangered to Threatened (Service 2014a).

Critical Habitat

The Service designated critical habitat for the tidewater goby on November 20, 2000 (Service 2000), and a revised designation to the critical habitat was published on January 31, 2008 (Service 2008a) and again on February 6, 2013 (Service 2013b). This rule identifies 12,156 acres of within 44 critical habitat units in Del Norte, Humboldt, Mendocino, Sonoma, Marin, San Mateo, Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego Counties, California. There is approximately 1,728 acres of designated critical habitat for the tidewater goby within the jurisdictional boundary of the Sacramento Fish and Wildlife Office.

Based on our current knowledge of the physical or biological features and habitat characteristics required to sustain the species' life-history processes, we determine that the physical and biological features (PBFs) specific to the tidewater goby are:

> PBF-1: Persistent, shallow (in the range of approximately 0.3 to 6.6 feet (0.1 to 2 meters)), still-to-slow-moving lagoons, estuaries, and coastal streams with salinity up to 12 parts per thousand, which provide adequate space for normal behavior and individual an population growth that contain one or more of the following:
>
> a. Substrates (e.g., sand, silt, mud) suitable for the construction of burrows for reproduction;
> b. Submerged and emergent aquatic vegetation, such as *Potamogeton pectinatus*, *Ruppia maritima*, *Typha latifolia*, and *Scirpus* spp., that provides protection from predators and high flow events; or
> c. Presence of a sandbar(s) across the mouth of a lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary, thereby providing relatively stable water levels and salinity.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the tidewater goby occurs within the Action Area.

Valley Elderberry Longhorn Beetle

The valley elderberry longhorn beetle (VELB) *(Desmocerus californicus dimorphus*), occurs within the California Central Valley. The CNDDB (2018) lists 271 occurrences for this species. The species' range extends from approximately Shasta County south to Fresno County, including the valley floor and lower foothills. The majority of VELB are documented below 500 feet (152 meters) in elevation. VELB habitat includes both riparian and non-riparian areas where elderberry shrubs are present. They occur only in association with its host plant, elderberry (*Sambucus* ssp.).

The primary threat to VELB and its elderberry shrub host plant are the significant loss, degradation or modification of riparian and other natural habitats. The species is estimated to occupy only 16 to 21 percent of its historical range. The result is a rare, patchy distribution within the limited and fragmented riparian areas within the California Central Valley. Riparian habitat loss is associated with agriculture conversion, levee construction and maintenance and stream channelization, and the impacts associated with urbanization. Impacts to elderberry shrubs associated maintenance activities include pruning of elderberry shrub branches along levees, roadways, trails, and other areas to control visual obstructions, or for aesthetic reasons. Invasive nonnative plants may affect the species through competition for space and resources with its host plant (Service 2014c).

The recovery plan for VELB does not identify recovery units. However, the Action Area includes all known occurrences and habitat for the species. While there have been continued losses of VELB habitat throughout its range, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the range-wide status of the beetle, please refer to the Withdrawal of the Proposed Rule to Remove the Valley Elderberry Longhorn Beetle from the Federal List of Endangered and Threatened Wildlife (Service 2014c).

Critical Habitat

On August 8, 1980, the final rule determining critical habitat for the valley elderberry longhorn beetle was published in the Federal Register on August 8, 1980 (Service 1980). Within the Action Area, the rule designates approximately 515 acres within two critical habitat units in Sacramento County, California. These designated areas of critical habitat are the American River Parkway Zone, an area along the lower American River at Goethe and Ancil Hoffman Parks, and the Sacramento Zone, an area located approximately one-half-mile from the American River downstream from the American River Parkway Zone. These critical habitat areas support large numbers of mature elderberry shrubs with extensive evidence of beetle use.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the VELB occurs within the Action Area.

California Freshwater Shrimp

The California freshwater shrimp occurs or has the potential to occur within the Action Area in Marin, Napa, and Sonoma Counties. The CNDDB (2018) lists 20 occurrences for the California freshwater shrimp. At the time of the most recent 5-year review, California freshwater shrimp were

found in 23 streams: Atascadero Creek, Big Austin Creek, Blucher Creek, Bud Creek, Cheda Creek, East Austin Creek, Ebabias Creek, Fallon Creek, Franz Creek, Garnett Creek, Green Valley Creek, Huichica Creek and an unnamed tributary to Huichica Creek, Jonive Creek, Keys Creek, Lagunitas Creek, Napa River, Olema Creek, Redwood Creek, Salmon Creek, Sonoma Creek, Stemple Creek, Walker Creek, and Yulupa Creek (Service 2011c). CNDDB identifies one additional stream as having California freshwater shrimp: Hudspeth Creek. The California freshwater shrimp is found in low elevation (less than 116 meters, 380 feet), low gradient (generally less than 1 percent) perennial freshwater streams or intermittent streams with perennial pools where banks are structurally diverse with undercut banks, exposed roots, overhanging woody debris, or overhanging vegetation (Service 1998b).

Threats to the California freshwater shrimp and its habitat include agricultural activities, residential development, water pollution, water diversions, recreation activities (summer dams), chemicals, and channelization. Additional threats include gravel mining, water development, urban runoff, flood control, and bank protection (Service 2011c).

The Recovery Plan for the California Freshwater Shrimp (Service 1998b) does not have recovery units *per se*; however, it does identify four watersheds with known populations that require a watershed plan for down listing. These watersheds are the tributary streams in the lower Russian River drainage, coastal streams flowing directly into the Pacific Ocean, streams draining into Tomales Bay, and streams flowing into San Pablo Bay. The Action Area includes all occurrences. While there have been continued losses of California freshwater shrimp habitat throughout its range, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the range-wide status, please refer to the California freshwater shrimp (*Syncaris pacifica*) 5-Year Review: Summary and Evaluation (Service 2011c). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

Critical habitat has not been designated for the California freshwater shrimp.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the California freshwater shrimp occurs within the Action Area.

Bay Checkerspot Butterfly

The Bay checkerspot butterfly occurs or has the potential to occur within the Action Area in Santa Clara and San Mateo Counties. The CNDDB (2018) lists 19 occurrences for the Bay checkerspot butterfly. Currently, the species is largely restricted to grasslands with host plants on serpentine-like soils in Santa Clara and San Mateo Counties. It also occurs in non-serpentine annual grassland occupied by its host plants on San Bruno Mountain in San Mateo County, where it was extirpated until recently reintroduced to serpentine grasslands in Edgewood Park and non-serpentine annual grasslands at San Bruno Mountain. The primary larval host plant for the butterfly is a small, annual, native plantain (*Plantago erecta*) (Service 1998c). The butterfly also frequently requires the presence of a secondary host plant, either purple owl's-clover (*Castilleja densiflora*) or exserted paintbrush (*Castilleja exserta*) (Singer 1972, p. 76; Murphy and Ehrlich 1980, p. 316; Weiss 1999, p. 1478) since owl's clover and the paintbrush remain edible longer than the plantain.

The primary threats to the Bay checkerspot butterfly are habitat degradation and loss caused by non-native plants displacing or reducing native food plants, and urban and suburban development (Service 1998c). Habitat loss has reduced the number and size of extant Bay checkerspot butterfly populations. Smaller populations are more vulnerable to extinction. Loss of serpentine of habitats or reduction of these habitats to non-viable sizes has increased the distance between populations and making genetic exchange and recolonization more difficult (Service 1998c). Invasion of non-native species into native grasslands is also a major cause of decline, choking out native food and host plant species. Trampling associated with increased human activity also threatens eggs, larvae and adult butterflies. Hikers, bicyclists, and off-road vehicles can crush larvae. These activities may also harm food plants, indirectly decreasing larval survival. Other noted threats include illegal collection, inappropriate grazing practices, pesticide use and road kill.

The Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area (Service 1998c), which includes the Bay checkerspot butterfly, identifies five core areas: one on the San Francisco peninsula in San Mateo County (Edgewood County Park) and four in Santa Clara County (Coyote Ridge in Santa Clara County), as well as a number of satellite populations. The Action Area includes all occurrences and recovery areas. While there have been continued losses of Bay checkerspot butterfly habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the range-wide status, please refer to the Bay Checkerspot Butterfly *(Euphydryas editha bayensis)* 5-Year Review: Summary and Evaluation (Service 2009a). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

The Service designated critical habitat for the Bay checkerspot butterfly on February 29, 2001 (Service 2001b) and a revised designation to the critical habitat was published on August 26, 2008 (Service 2008b). The rule identifies 18,293 acres within 13 critical habitat units in San Mateo and Santa Clara Counties, California. All of these acres and units are within the Sacramento Fish and Wildlife Office Action Area.

Within these units that are considered to be essential for the conservation and recovery of the Bay checkerspot butterfly, the Service has determined the following physical and biological features:

> PBF 1: The presence of annual or perennial grasslands with little to no overstory that provide north-south and east-west slopes with a tilt of more than 7 degrees for larval host plant survival during periods of atypical weather (for example, drought). Common grassland species include wild oats (*Avena fatua*), soft chess (*Bromus hordeaeceus*), California oatgrass (*Danthonia californica*), Italian ryegrass (*Lolium multiflorum*), purple needlegrass (*Nassella pulchra*), and Idaho fescue (*Festuca idahoensis*); less abundant in these grasslands are annual and perennial forbs such as filaree (*Erodium botrys*), true clovers (*Trifolium* spp.), and dwarf plantain (*Plantago erecta*). These species, with the exception of the dwarf plantain, are not required by the Bay checkerspot butterfly, but merely are provided here as an example of species commonly found in California grasslands;
>
> PBF 2: The presence of the primary larval host plant, dwarf plantain (*Plantago erecta*), and at least one of the secondary host plants, purple owl's-clover (*Castilleja densiflora*) or exserted paintbrush (*Castilleja exserta*), are required for reproduction, feeding, and larval development;
>
> PBF 3: The presence of adult nectar sources for feeding. Common nectar sources include desert parsley (*Lomatium* spp.), California goldfields (*Lasthenia californica*), tidy-tips (*Layia platyglossa*), sea

muilla (*Muilla maritima*), scytheleaf onion (*Allium falcifolium*), flase babystars (*Linanthus androsaceus*), and intermediate fiddleneck (*Amsinckia intermedia*);

PBF 4: Soils derived from serpentinite ultramafic rock (Montara, Climara, Henneke, Hentine, and Obispo soil series) or similar soils (Inks, Candlestick, Los Gatos, Fagan, and Barnabe soil series) that provide areas with fewer aggressive, nonnative plant species for larval host plant and adult nectar plant survival and reproduction; and

PBF 5: The presence of stable holes and cracks in the soil, and surface rock outcrops that provide shelter for the larval stage of the Bay checkerspot butterfly during summer diapause.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the Bay checkerspot butterfly occurs within the Action Area.

Callippe Silverspot Butterfly

The callippe silverspot butterfly occurs or has the potential to occur within the Action Area in San Mateo, Solano, Sonoma and Alameda Counties. The CNDDB (2018) lists 12 occurrences for the callippe silverspot butterfly. The species currently is known from isolated populations occurring in grasslands with its host plant in northern San Mateo County (San Bruno Mountain.), Solano County (Cordelia Hills), Sonoma County (Sears Point), Alameda County (hills near Pleasanton, watershed east of Calaveras Reservoir) (Terry, J, pers. comm., 2018). The habitat for the callippe silverspot butterfly is native grasslands and associated habitats in the San Francisco Bay area (Service 1997). These grasslands are associated with deep soils that have established grass cover and contain the larval host plant *Viola pedunculata* (Service 2009b).

The primary threats to the callippe silverspot butterfly include habitat loss and fragmentation resulting from urbanization throughout the greater San Francisco Bay area. As habitat has been lost and fragmented, the small populations have become increasingly isolated, eventually affecting dispersal and genetic exchange between populations (Service 1997). Invasion of non-native plants and shrubs is another significant threat to the callippe silverspot butterfly. Non-native species have displaced grassland habitats; invasive grasses and herbs displace callippe silverspot butterfly host plants and food plants, or make them difficult to access. Trampling by increased human activity also threatens this species. Hikers, bicyclists, and off-road vehicles can kill larvae. These activities may also harm food plant, indirectly decreasing larval survival (Service 2009b).

There is no recovery plan for this species. The Action Area includes all occurrences. While there have been continued losses of callippe silverspot butterfly habitat throughout its range, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the range-wide status, please refer to the Callippe Silverspot Butterfly *(Speyeria callippe callippe)* 5-Year Review: Summary and Evaluation (Service 2009b). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

No critical habitat has been designated for the callippe silverspot butterfly.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the callippe silverspot butterfly occurs within the Action Area.

Myrtle's Silverspot Butterfly

The Myrtle's silverspot butterfly occurs or has the potential to occur within the Action Area in Marin and Sonoma Counties. The CNDDB (2018) lists 17 occurrences for the Myrtle's silverspot butterfly. The species currently is known to occur up to 3 miles inland in Marin and Sonoma Counties: from Point Reyes in Marin County and north to the mouth of Russian River in Jenner in Sonoma County (Terry, J., pers. comm. 2018). The Myrtle's silverspot butterfly occurs in association with coastal dunes, coastal scrub and coastal prairies that are protected from winds (Launer *et al.* 1992). One of the critical factors in the distribution of the Myrtle's silverspot butterfly is the presence of its host plant, the western dog violet (*Viola adunca*) (Service 2009c).

Development is the primary threat to the Myrtle's silverspot butterfly, and development of the remaining habitat for this species will remain a threat until sufficient habitat for the species is acquired and protected. Increased human activity is also threat; foot traffic, cyclists and off-road vehicles pose hazards to the larval stages of the butterfly by inadvertently trampling their host plant (Service 1992).

The Recovery Plan for the Myrtle's silverspot butterfly does not identify recovery units; however, it does state that for downlisting, habitat in northwestern Marin and southwestern Sonoma counties must be protected in perpetuity (Service 1998a). The Action Area includes these key recovery areas and all occurrences. While there have been continued losses of Myrtle's silverspot butterfly habitat throughout its range, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the range-wide status, please refer to the Myrtle's Silverspot Butterfly *(Speyeria zerene myrtleae)* 5-Year Review: Summary and Evaluation (Service 2009c). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

Critical habitat has not been designated for the Myrtle's silverspot butterfly.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the Myrtle's silverspot butterfly occurs within the Action Area.

Vernal Pool Branchiopods

In California, primary vernal pool habitat forms a discontinuous ring around the margins of the California Central Valley. The majority of pools occur on the older alluvial terraces along the eastern margin of the valley, but vernal pool habitat also occurs on high terraces on the eastern sides of the inner Coast Ranges and an additional band through the valley center. Vernal pool complexes are typified by a range of aquatic habitats, although some locales have more pools of one type (e.g., small, shallow, and short-lived, or playa-type pools, etc.) than other areas (Holland 1998a). Several counties (Glenn, Colusa, and Yolo) have little potential habitat for the branchiopods because they lack substantial areas of hardpan soils and have little flat land that is not in agriculture. Tehama, Yuba, Solano, and Madera counties contain the highest-density areas of vernal pools, while

Sacramento, Merced, and Fresno counties have many areas with high-density pools. Of the 20 Central Valley counties, Yuba, Placer, Sacramento, and Madera counties have the highest average densities (Holland 1978). These areas of high-density habitat likely are especially important to the population dynamics of vernal pool branchiopods such as the vernal pool fairy. Up to 85 percent of vernal pools may lack large vernal pool branchiopods (Helm 1998). Holland (1998) estimated that extant vernal pool landscapes throughout the Central Valley had fallen below 1,000,000 acres, or roughly one quarter of the valley's estimated original vernal pool habitat.

In California's Central Coast Ranges, vernal pool habitats are more thinly distributed than in the Central Valley, with only 42,488 acres of vernal pool habitat occurring out of a total of 9,574,099 acres in the region (Holland 2003). Habitat patches are smaller and more isolated; however, loss of vernal pool habitat in this area also appears to be accelerating. Holland (2003) recorded a 2-3 percent annual loss rate between 1994 and 2000, and almost a 12 percent loss between 2000 and 2001, with the loss often due to agricultural conversion (to hay or vineyards).

Vernal Pool Fairy Shrimp

The vernal pool fairy shrimp occurs or has the potential to occur within the Action Area where its vernal pool habitat occurs. The CNDDB (2018) lists 766 occurrences for the vernal pool fairy shrimp. In California, the range of the species extends from disjunct locations in Riverside County and the Coast Ranges, north through Central Valley grasslands to Tehama County (Service 2007a). The vernal pool fairy shrimp is endemic to California where it exists only in ephemeral freshwater habitats, including alkaline pools, clay flats, vernal lakes, vernal pools, vernal swales, and other seasonal wetlands in California (Helm 1998).

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005a) identifies 45 core recovery areas in 13 vernal pool regions for the vernal pool fairy shrimp: Carrizo Region (4 core areas), Central Coast Region (2 core areas), Klamath Mountain Region (3 core areas), Lake-Napa Region (1 core area), Livermore Region (1 core area), Northeast Sacramento (4 core areas), Northwest Sacramento (3 core areas), San Joaquin Region (2 core areas), Santa Barbara Region(2 core areas), Solano-Colusa Region (3 core areas), Southeast Sacramento (4 core areas), Southern Sierra Foothills (6 core areas), and Western Riverside Region (3 core areas). The vernal pool fairy shrimp is presumed to occur in at least one pool in each of these core areas (Service 2005a). The Action Area includes all of these 45 core areas and all occurrences. While there have been continued losses of vernal pool fairy shrimp habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Vernal Pool Fairy Shrimp *(Branchinecta lynchi)* 5-Year Review: Summary and Evaluation (Service 2007a). No change in the species' listing status was recommended in this species' 5-year review.

Vernal Pool Tadpole Shrimp

The vernal pool tadpole shrimp occurs or has the potential to occur within the Action Area within its patchy distribution across the California Central Valley, from Shasta County southward to northwestern Tulare County, with isolated occurrences in Alameda and Contra Costa Counties. The CNDDB (2018) lists 324 occurrences for the vernal pool tadpole shrimp. The vernal pool tadpole shrimp occurs only in ephemeral freshwater habitats, including alkaline pools, clay flats, vernal lakes, vernal pools, vernal swales, and other seasonal wetlands in California (Helm 1998).

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005d) identifies 24 core recovery areas found within seven vernal pool regions for this species: Central Coast Region (1 core area), Northeast Sacramento Region (5 core areas), Northwest Sacramento Region (2 core areas), San Joaquin Region (2 core areas), Solano-Colusa Region (5 core areas), Southeast Sacramento Region (4 core areas) and Southern Sierra Foothills Region (5 core areas). The Action Area includes all of these 24 core areas. While there have been continued losses of vernal pool tadpole shrimp habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Vernal Pool Tadpole Shrimp *(Lepidurus packardi)* 5-Year Review: Summary and Evaluation (Service 2007b). No change in the species' listing status was recommended in this species' 5-year review.

Conservancy Fairy Shrimp

The conservancy fairy shrimp occurs or has the potential to occur within the Action Area in Butte, Glenn, Tehama, Merced, Placer, Solano, Stanislaus, Yolo Counties, and one disjunct population on the Central Coast of Ventura County (Service 2012b). The CNDDB (2018) lists 43 occurrences for the conservancy fairy shrimp. The majority of sites inhabited by this species are relatively large and turbid vernal pools called playa pools (Helm 1998, Eriksen and Belk 1999, Vollmar 2002, Service 2005a). Playa pools typically remain inundated much longer than most vernal pools, often well into the summer, even though they normally have maximum depths comparable to vernal pools (Vollmar 2002).

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005e) identifies eight core recovery areas found within five vernal pool regions for the conservancy fairy shrimp: Vina Plains (Northeast Sacramento Region), Caswell and Grasslands Ecological Area (San Joaquin Region), Ventura County (Santa Barbara Region), Jepson Prairie, Sacramento National Wildlife Refuge and Collinsville (Solano-Colusa Region), and Madera (Southern Sierra Foothills Region). The Action Area includes all occurrences and core recovery areas. While there have been continued losses of conservancy fairy shrimp habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Conservancy Fairy Shrimp *(Branchinecta conservatio)* 5-year Review: Summary and Evaluation (Service 2012b). No change in the species' listing status was recommended in this species' 5-year review.

Longhorn Fairy Shrimp

The longhorn fairy shrimp occurs or has the potential to occur within the Action Area in Alameda, Contra Costa, Fresno, Merced and San Luis Obispo Counties (Service 2012a). The CNDDB (2018) lists 20 occurrences for this species. The longhorn fairy shrimp is known only from a few localities, and these sites contain very different types of vernal pool habitats. Longhorn fairy shrimp in the Livermore Vernal Pool Region in Contra Costa and Alameda Counties live in small, clear, sandstone outcrop vernal pools that are sometimes no larger than 3.3 feet (1 m) in diameter, have a pH near neutral, and very low alkalinity and conductivity. Water temperatures in these vernal pools have been measured between 50 and 64 degrees Fahrenheit (Helm 1998). In the San Joaquin and Carrizo Vernal Pool Regions, the longhorn fairy shrimp occur in clear to turbid, grassland pools that may be as large as 203.4 feet (61.7 m) in diameter. Water temperatures in these grassland vernal pools are also warmer, between 50 to 82 degrees Fahrenheit (Helm 1998, Eriksen and Belk 1999).

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005e) identifies five core recovery areas found within three vernal pool regions for the longhorn fairy shrimp: North Carrizo Plain and South Carrizo Plain (Carrizo Region), Altamont Hills (Livermore Region), and Grasslands Ecological Area (San Joaquin Region). The Action Area includes all occurrences and core areas. While there have been continued losses of longhorn fairy shrimp habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Longhorn Fairy Shrimp *(Branchinecta longiantenna)* 5-year Review: Summary and Evaluation (Service 2012a). No change in the species' listing status was recommended in this species' 5-year review.

Threats to Vernal Pool Branchiopods

Habitat loss and fragmentation is the greatest threat to the survival and recovery of vernal pool species. Habitat loss and fragmentation generally is a result of urbanization, agricultural conversion, and mining. Habitat loss occurs in the form of habitat alteration and degradation resulting from changes to natural hydrology; invasive species; incompatible grazing regimes, including insufficient grazing for prolonged periods; infrastructure projects such as roads, water storage and conveyance and utilities; recreational activities such as off-highway vehicles and hiking; erosion; and contamination. This habitat loss and fragmentation contributes to the isolation, fragmentation and functionality of vernal pool habitats. Direct loss of habitat generally represents irreversible damage to vernal pools; it disrupts the physical processes conducive to functional vernal pool ecosystems. The more severe the alteration and destruction, the more difficult it is to recover such areas in the future due to disruption of soil formations, hydrology, seed banks, and other components of a functional vernal pool ecosystem.

Critical Habitat

The Service designated critical habitat collectively for four vernal pool branchiopods and 11 vernal pool plants in 34 counties in California and one county in southern Oregon on August 6, 2003 (Service 2003b) and a revised designation of critical habitat of approximately 858,846 acres was published on August 11, 2005 (Service 2005a).

The PBFs of critical habitat for the four vernal pool branchiopods are the habitat components that provide:

> PBF 1: Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools, and providing for dispersal and promoting hydroperiods of adequate length in the pools;
>
> PBF 2: Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of:
>
> - 18 days for vernal pool fairy shrimp;
> - 23 days for longhorn fairy shrimp;
> - 19 days for conservancy fairy shrimp;
> - 41 days for vernal pool tadpole shrimp;
>
> in all but the driest years. Thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the

development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands;

PBF 3: Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding; and

PBF 4: Structure within the pools consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

On February 10, 2006, the Service published a final rule providing species-specific unit descriptions and maps identifying the critical habitat for each individual species. The rule identified the following units and acres within the Action Area for these four vernal pool branchiopods species.

- 597,821 acres within 32 critical habitat units for the vernal pool fairy shrimp in Jackson County, Oregon, and Alameda, Amador, Contra Costa, Fresno, Kings, Mariposa, Monterey, Napa, Placer, San Benito, San Joaquin, San Luis Obispo, Santa Barbara, Shasta, Stanislaus, Tehama, Tulare, Ventura, and Yuba counties, California.

- 13,557 acres within three critical habitat units for the longhorn fairy shrimp in Alameda, Contra Costa, Merced, and San Luis Obispo counties, California.

- 161,786 acres within six critical habitat units for the conservancy fairy shrimp in Butte, Colusa, Mariposa, Merced, Solano, Stanislaus, Tehama, and Ventura Counties, California.

- 228,785 acres within 16 critical habitat units for the vernal pool tadpole shrimp in Alameda, Amador, Butte, Colusa, Fresno, Kings, Madera, Mariposa, Merced, Sacramento, Shasta, Solano, Stanislaus, Tehama, Tulare, Yolo, and Yuba Counties, California.

Based on the documented presence of these four vernal pool branchiopod species in the Action Area, and the biology and ecology of these species, the Service has determined that vernal pool fairy shrimp, vernal pool tadpole shrimp, conservancy fairy shrimp and longhorn fairy shrimp occur within the Action Area.

Sacramento Orcutt Grass

The Sacramento Orcutt grass occurs or has the potential to occur within the Action Area in Sacramento County. The CNDDB (2018) lists 12 occurrences for the species. Sacramento Orcutt grass is an annual grass that occurs in vernal pools on high terrace sites in a narrow zone of remnant depositional stream terraces at the base of the Sierra Nevada foothills (Stone *et al.* 1988).

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005e), which includes the Sacramento Orcutt grass, identifies three core areas for the species' recovery: Cosumnes/Rancho Seco, Mather and Phoenix Field and Park, all within the Southeast Sacramento vernal pool region. The Action Area includes all occurrences and core areas. While there have been continued losses of Sacramento Orcutt grass habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of

jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Sacramento Orcutt Grass *(Orcuttia viscida)* 5-Year Review: Summary and Evaluation (Service 2008c). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

The Service designated critical habitat collectively for four vernal pool branchiopods and 11 vernal pool plants in 34 counties in California and one county in southern Oregon on August 6, 2003 (Service 2003b) and a revised designation of critical habitat of approximately 858,846 acres was published on August 11, 2005 (Service 2005a).

The PBFs of critical habitat for the Sacramento Orcutt grass are habitat components that provide:

> PBF 1: Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools and providing for dispersal and promoting hydroperiods of adequate length in the pools;
>
> PBF 2: Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species typically exclude both native and nonnative upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

On February 10, 2006, the Service (2006a) published a final rule providing species-specific unit descriptions and maps identifying the critical habitat for each individual species. The rule designated 33,273 acres for the Sacramento Orcutt grass within three critical habitat units in Amador and Sacramento Counties.

Threats

Habitat loss and fragmentation is the largest threat to the survival and recovery of the vernal pool species. Habitat loss and fragmentation generally is a result of urbanization, agricultural conversion, and mining. Habitat loss also occurs in the form of habitat alteration and degradation resulting from changes to natural hydrology; invasive species; incompatible grazing regimes, including insufficient grazing for prolonged periods; infrastructure projects such as roads, water storage and conveyance and utilities; recreational activities such as off-highway vehicles and hiking; erosion; and contamination. This habitat loss and fragmentation contributes to the isolation, fragmentation and functionality of vernal pool habitats. Direct loss of habitat generally represents irreversible damage to vernal pools; it disrupts the physical processes conducive to functional vernal pool ecosystems. The more severe the alteration and destruction, the more difficult it is to recover such areas in the future due to disruption of soil formations, hydrology, seed banks, and other components of a functional vernal pool ecosystem. An additional threat to vernal pool plants is the decline of essential pollinators due to habitat fragmentation and the loss of the upland habitat that supports pollinator species. Habitat loss and degradation interferes with reproduction and dispersal of pollinators. It is likely that many of these pollinators require the uplands surrounding vernal pools for completion of their life cycle. For insect pollinated plants, the reduction of available habitat for

pollinators could decrease pollinator populations, which could reduce reproductive success of the plants.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that Sacramento Orcutt grass occurs within the Action Area.

Effects of the Proposed Action

The federally-listed species addressed in this programmatic consultation may be directly or indirectly harmed (e.g., killed or injured) as a result of implementing FEMA-funded projects. The effects to listed species addressed in this programmatic biological opinion are project-specific and widely variable. The likelihood that a proposed project will adversely affect covered species or their critical habitats depends on a variety of factors, including, but not limited to, the conditions present in the individual project action area, the probability of species occurrence, timing of the activity, and the quality and quantity of the habitat within the project footprint and its vicinity. For proposed projects covered under the programmatic biological opinion, we anticipate that implementation of general avoidance and minimization measures and species-specific conservation measures, as proposed, will reduce adverse effects, in some instances to levels that are insignificant, discountable, or wholly beneficial.

Activities that are likely to cause direct or indirect harm to covered species and their habitats include grading and earthmoving; road construction; excavation; maneuvering vehicles and heavy equipment on and off roads; discharge of contaminants into soil and water; production of noise, vibration, and dust; vegetation management; prescribed or accidental fire; placement and removal of cofferdams and other temporary water diversions in creeks and rivers; discharge of fill and sediments in water; and placement of riprap and water control structures. Some animal species may occur in close proximity to disaster-affected areas to be indirectly affected by project activities that extend beyond the damaged features themselves, which may include access routes, staging areas, borrow sites, and downstream effects in watercourses. Indirect effects from the covered activities can affect a species ability to breed, feed, disperse, and find shelter. Such indirect effects include the removal of cover and/or habitat, which in turn make the species more vulnerable to predation as they need to travel further to find suitable areas to breed, feed and/or find shelter. Disturbing or displacing species or host plants can reduce the likelihood of breeding, feeding, or finding shelter. Invasive non-native species may be introduced which can result in increased interspecific competition and displacement, and introductions of pathogens can lead to decreased fitness of species and make them more vulnerable to diseases.

Projects funded by FEMA under the Disaster, Mitigation, and Preparedness Programs are limited to repair and replacement of existing facilities and natural areas, rather than newer or expanded construction. Also, many of the projects are in previously disturbed areas. Many of the effects of the proposed projects funded by FEMA will be temporary and localized; conditions are expected to return to baseline levels or become better over time periods ranging from minutes (noise) to a few years (recovery of vegetation). Other actions, while seemingly minor when implemented by themselves, may have cumulative, long-term effects over time. For example, the repair of multiple erosion sites along an earthen canal or creek with riprap will have long-term, cumulative effects both upstream and downstream of each individual project site by hardening the embankment, thereby having an effect on the system's water velocity, transport volume, and other parameters, which may include water quality.

Effects to all covered Species

The following effects are applicable to both aquatic and terrestrial covered species.

Loss and Disturbance of Habitat

All of the covered species may be directly or indirectly affected by temporary disturbance to, or permanent loss of, suitable habitats as a result of proposed projects. Examples of activities that may temporarily or permanently disturb or remove aquatic or terrestrial habitats can be found in the Description of the Proposed Programmatic Actions section of this programmatic biological opinion.

Temporary and permanent habitat disturbances can adversely affect covered species by reducing the availability of key habitat components, which species need for breeding, feeding, sheltering, and dispersing. Habitat loss and disturbance may reduce prey availability and foraging habitat, remove or damage host-plant species, reduce or remove shade cover, or cause incremental degradation or temperature increases to in-water habitats. Additionally, loss of habitat can cause an increase in both interspecific and intraspecific competition leading to displacement, which ultimately decrease an individual's fitness through reduced survival and reproductive success due to physical and physiological constraints. Construction-related habitat disturbances may cause mortality or non-lethal harm such as injury to surviving individuals by being crushed by equipment, maintenance materials, or worker foot traffic.

Although permanent loss or alteration of habitat may occur as part of a Subapplicant's proposed project, this will occur infrequently, and most project footprints are small (many less than one acre), which will affect only small areas. For projects such as fuel reduction, erosion, and sedimentation control, these adverse effects may occur in the short term, but may ultimately result in beneficial effects to plants, wildlife, and covered species.

Implementation of the proposed conservation measures will avoid or reduce the extent and severity of adverse effects. For example, requirements to conduct work outside of the sensitive periods, for breeding, nesting, migration and dispersal periods for covered species, will reduce the effects of such activities which include human disturbance and vibration and noise of construction equipment. Restoring areas to pre-project conditions will enable species to move back into areas after project completion. Providing environmental awareness training to workers and having biological monitors onsite during all construction activities will reduce or eliminate encounters with individual species. Also, clearly delineating work areas and avoidance areas using appropriate construction fencing, seasonal limitations for breeding areas, and appropriate buffers around, for instance, vernal pools. For listed butterflies, appropriate buffers around host plants and hilltop breeding areas as well as seasonal limitations for breeding areas will also reduce or eliminate direct effects. This is also the case with species that use small mammal burrows as refugia, such as California tiger salamanders and California red-legged frogs. The *Conservation Measures* section of this opinion provides a full description of these general and species-specific measures.

Riparian Habitat Removal or Degradation

Listed species inhabiting riparian and aquatic habitats, including California red-legged frog, giant garter snake, California freshwater shrimp, valley elderberry longhorn beetle, and least Bell's vireo, may be directly or indirectly affected by riparian habitat removal and/or degradation by activities such as the following.

- Vegetation management
- Debris removal
- Repairing, realigning, or otherwise modifying roads, trails, utilities, and rail lines
- Repairing, replacing or installing culverts
- Repairing, stabilizing, or armoring embankments
- Creating, widening, clearing, or dredging a waterway
- Constructing or modifying a water crossing
- Constructing or modifying other flood control structures

Habitat fragmentation occurs when areas of connected habitat are disjoined by the removal or reduction of habitat. Therefore, the removal or reduction of riparian habitat has the consequence of fragmenting riparian habitats which have the added consequences of isolation and edge effects. Isolation effects can negatively impact a species ability to find suitable mates thereby reducing its reproductive success. If populations are isolated for long periods of time, this can lead to inbreeding depressions which can make the population more vulnerable to stochastic events. Edge effects generally have a negative impact on both the biotic and abiotic environments. Edge effect negatively impact species through increased risk through the introduction of invasive competitors or pathogens and an increased risk of predation. Effects to the abiotic environment can also negatively impact species by increasing water and ambient temperatures leading to physiological changes that could make the habitat unsuitable for species at all life stages.

California red-legged frog and California tiger salamander riparian habitat can become isolated and fragmented due to the proposed covered activities. The fragmentation and isolation of a subpopulation can lead to a decline in dispersal between subpopulations, jeopardizing the metapopulation. The isolated populations are then vulnerable to local extinction due to stochastic environmental and human-induced events. In addition to fragmentation, the removal of riparian cover can also have negative effects on reproductive success of both the California red-legged frog and the California tiger salamander by allowing more solar radiation to heat pools and slow moving streams. Since the California red-legged frog and the California tiger salamander egg masses can tolerate a maximum water temperature of 70 °F and 66 °F, respectively, incremental increases to water temperatures will reduce reproductive success of both species.

The valley elderberry longhorn beetle occurs throughout the Central Valley in metapopulations and is dependent on a contiguous riparian habitat making is susceptible to habitat fragmentation. The valley elderberry longhorn beetle has a limited dispersal ability adding to their vulnerability of fragmented habitats limiting their opportunity to successfully colonize unoccupied habitat. As a consequence, isolated subpopulations are more vulnerable to stochastic events that can reduce or eliminate isolated populations. Loss of elderberry shrubs associated with riparian habitat will reduce available habitat for the valley elderberry longhorn beetle and may result in take if occupied shrubs are damaged or removed (Service 2017c).

The long-term or permanent removal of riparian vegetation may reduce in-stream habitat quality, riparian habitat complexity, and erosion and sedimentation in cleared riparian areas. Adverse effects may occur to California freshwater shrimp, which depend on complex riparian habitat that includes fine root systems, root wads and overhanging vegetation and woody debris. Loss of riparian vegetation adversely affects the ability of shrimp to disperse and affects turbidity and water temperatures in the creeks and streams.

For the least Bell's vireo, the permanent removal of riparian vegetation could result in reduced quality, quantity, and complexity of habitat within and adjacent to project areas, which can reduce

the suitability of least Bell's vireo nesting areas. Across the landscape, tree and understory removal within suitable foraging, dispersal, roosting, or nesting habitat could indirectly affect least Bell's vireo if tree species composition, structural diversity, or habitat density is significantly or permanently altered. Actions that remove or degrade the quality of riparian habitats may adversely affect their reproductive success by increasing their vulnerability of predation to cowbird parasitism and predation by scrub-jays, hawks, raccoons, and coyotes.

Implementing the conservation measure requiring revegetation of stream and riverbanks with native species when proposed projects remove riparian vegetation during construction activities will minimize these effects to covered species. Removed vegetation will be replaced with in-kind species at a 3:1 ratio with an 80 percent planting survival five years after planting. Conservation measures to clearly delineate and minimize the project footprint will minimize adverse effects to riparian habitats and associated covered species. Requiring Service-approved biological monitors will minimize direct injury and harm to listed species by identifying their presence and allowing them to move out of harm's way. The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Hazardous Materials Spills

Spills of hazardous materials may directly or indirectly affect all of the covered species. Chemical contamination of soil or water sources could occur from equipment leaks (e.g., diesel fuel, oil, hydraulic fluids, and antifreeze), refueling spills, or an accidental spill during project implementation. Accidental spills of hazardous materials can degrade water quality or upland habitat to a degree where species are adversely affected or killed by chemicals interfering with physiological pathways. For example, some hazardous chemicals have been shown to mimic estrogen in vertebrates, which has been hypothesized as a leading mechanism in amphibian decline (Jennings 1996).

The implementation of proposed conservation measures will significantly reduce these hazards. Subapplicants will prepare a Spill Prevention and Pollution Control Plan to minimize the risk of spilled hazardous materials and other construction debris from entering soils and waterways. Equipment will be inspected daily for fuel leaks, any fuel leaks discovered will be cleaned up immediately, wet cement and uncured concrete will not be allowed to enter waterways, stockpiled soils will be covered to prevent erosion, and all staging and hazardous material storage areas will be placed in upland areas that are paved, graveled, or otherwise non-erodible and away from water bodies or sensitive habitat. For proposed projects involving work over water, measures will be taken to ensure that construction debris is contained and does not fall into the water. Implementing these measures will minimize the effects of project-related disturbance on covered species and their habitat. The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Invasive Species and Pathogens

The introduction of pathogens, invasive plant and animal species could adversely affect any of the covered species. California red-legged frogs and California tiger salamanders are particularly vulnerable to introduced pathogens. Invasive species and pathogens are often introduced to uninvaded sites through construction soil and debris transported on construction equipment. Invasive species and pathogens also may be transferred via construction materials or on the clothing or boots of those working at the site. During in-water work, invasive species and pathogens may be introduced to a water body through ballast or bilge water discharge if vessels are inadequately cleaned prior to transfer between invaded and uninvaded sites. Pathogens may be introduced

through nursery plants used in revegetation and restoration.

Although not all non-native species have negative effects on the covered species, those that outcompete covered species are considered undesirable for their continued persistence. Therefore, introductions of invasive species can increase interspecific completion between listed species and non-native, invasive species. Invasive mosquitofish that are commonly stocked to help combat mosquito larvae have been shown to prefer fairy shrimp species over mosquito larvae (Leyse et al., 2004). Therefore, the introduction of mosquitofish into vernal pool complexes could lead to increased predation of vernal pool fairy shrimp, conservancy fairy shrimp, and longhorn fairy shrimp.

Invasive species can directly injure or kill covered species, or indirectly harm covered species by reducing prey abundance or detrimentally affect aquatic and riparian vegetation. Invasive plants species may also out-compete and crowd out covered plant species, as well as the host plants for listed butterflies.

Chytrid fungi are diverse, abundant, and widespread in aquatic ecosystems. They are known to infect a diverse assemblage of hosts across the tree of life. Although evidence is lacking for their effects on California red-legged frogs and California tiger salamander, some observations have indicated that both species tend to shed their skin at a much higher rate when infected in laboratory settings, which requires the use of additional energy (Service 2016 & 2017b). This allocation of resources to fend off chytrid infection could lead to decreased fitness if infected in the wild. The accidental introduction of chytrid fungi into an area could have significant adverse effects to the California red-legged frog and California tiger salamander. The introduction of non-native species into an ecosystem has the added possibility of introducing novel pathogens that could negatively affect species.

Implementing the proposed conservation measures will significantly reduce the introduction or spread of invasive species and pathogens. Subapplicants will properly clean construction equipment, clothing, waders and boots prior to moving between work sites, particularly if the prior work site is known or suspected to contain invasive species or pathogens. Subapplicants will take all precautions to prevent the introduction of amphibian disease pathogens if California red-legged frogs or California tiger salamanders must be handled or relocated. All persons entering the action area to handle amphibians after working in other aquatic habitats will disinfect all equipment and clothing. The Subapplicants will follow the guidelines in the California Department of Fish and Wildlife's (CDFW's) California Aquatic Invasive Species Management Plan to prevent the spread of invasive aquatic plant and animal species (CDFW 2008). The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Beneficial Effects

Beneficial effects include relocating facilities away from sensitive habitats, restoring native vegetation, removing invasive species, improving water quality and hydrology, and vegetation management. Stabilizing eroding banks, reducing sedimentation and turbidity, and replacing or removing structures that form partial or complete barriers with structures that enhance movement corridors or habitat connectivity also provide long-term beneficial effects for covered species. Existing structures may be modified or replaced in ways that provide shade and cover, reduce refugia for predators, replace hardened shorelines with living shoreline structures, improve hydrologic function of stream channels, or increase porosity of previously impervious surfaces. For

example, replacing an undersized, hanging culvert with an open bottom culvert may improve wildlife passage and allow better movement of substrate through the culvert. Wildfire risk-reduction activities may provide a beneficial effect to covered species by reducing the risk of large-scale catastrophic wildfires. Although the above mentioned scenarios can provide beneficial effects to covered species, it is important to note that these benefits can take months or years to be fully realized.

Effects to Aquatic Species

The following effects are primarily applicable to covered aquatic species, which include California red-legged frog, California tiger salamander, giant garter snake, California freshwater shrimp, tidewater goby and vernal pool species.

Erosion, Turbidity and Sedimentation

Increased erosion, turbidity, and sedimentation may affect aquatic species, particularly California red-legged frog and California tiger salamander eggs and larvae, California freshwater shrimp and vernal pool species. Effects include reduced visibility of prey or forage items, respiratory stress, temperature changes, and in severe cases, suffocation and damage to gills, lungs, or other organs. Heavy equipment use during in-water work activities such as installing temporary diversions or dewatering, may cause increased sedimentation. Construction-generated dust may be deposited into nearby waters and vegetation, and terrestrial or riparian vegetation removal and fuel reduction activities may increase erosion and sedimentation during storm runoff events. These activities can lead to the smothering of eggs thereby interfering with the species ability to complete its life cycle.

California freshwater shrimp may be adversely affected by in-stream work that causes high levels of siltation downstream. Although shrimp are usually able to survive in poor water quality conditions, excessive siltation could alter the quality of the habitat to the extent that use by individuals of the species is precluded. Siltation also could fill pools used by shrimp during summer low flows, reducing the extent or quality of shrimp habitat near the project area. Likewise, California red-legged frog and California tiger salamander eggs may be smothered by excessive silt and larvae may have difficulty locating food in turbid waters.

For most covered projects, implementing the proposed conservation measures and best management practices will likely reduce adverse effects to covered species, their prey, and their habitats within vernal pools and other aquatic habitat. These measures include restricting work during seasonal work windows, restricting the entry of heavy equipment into waterbodies, and establishing upland staging areas for equipment and materials. Installing silt fences, sediment curtains, and hay bales will reduce effects from erosion, turbidity, and sedimentation; the dewatering of work areas will minimize the amount and duration of suspended sediment. The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Underwater Noise, Vibration and Sound Pressure

Pile driving, in-water drilling, cutting, or excavation can have short-term adverse effects on covered aquatic species such as the tidewater goby, California red-legged frog, and giant garter snake, by increasing in-water noise and vibration. For example, pile driving in or adjacent to water causes high-intensity sound, which acts as a pressure wave that can cause barotrauma to tidewater gobies. California red-legged frogs, California tiger salamanders and giant garter snakes may be more

susceptible to injury and mortality from predation, desiccation and vehicular or foot traffic when project related noise and disturbance causes them to move away from sheltered habitat areas within a construction area.

Implementing the proposed conservation measures will minimize the effects of noise, vibration, and sound pressure. These include the use of work windows to avoid times that species such as the giant garter snake and California red-legged frog are most active, and using biological monitors to determine if animals are in the work area prior to ground disturbing activities. The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Streambed, Bank and Shoreline Modification

Any replacement of natural or armored banks that provide refugia for California red-legged frogs or giant garter snakes with banks that provide no such refugia (e.g., concrete crib walls or sacked concrete) will result in permanent habitat and permanent adverse effects to the hydrology and habitat quality of the stream or estuary. These activities will result in the removal of emergent and riparian vegetation along banks or in the channel or wetland, resulting, for example, in the loss of cover needed for giant garter snake basking, foraging, or shelter. Removal of burrows along streambanks that giant garter snakes and California red-legged frogs could use as refugia may result in increased mortality due to predation. Work in streams that causes unusually high levels of siltation downstream can also adversely affect California freshwater shrimp.

Implementing the proposed conservation measures will minimize adverse effects to species and habitats caused by these project activities. These measures include avoiding placement of roads, staging areas, and other facilities adjacent to aquatic ecosystems as much as possible, and returning contours of the aquatic substrate environments, vegetation, and flows to pre-construction conditions or better after the completion of work. Implementing best management practices for erosion control and reducing the area to be disturbed to the minimum necessary should decrease the amount of sediment that is washed downstream as a result of project activities. Designing projects to minimize the creation of new impervious surfaces and using bioengineering and living shorelines techniques may also avoid or minimize adverse effects, where applicable. The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Permanent Loss or Alteration of Vernal Pool Habitat

Vernal pool habitats support several covered species including four vernal pool branchiopods, California tiger salamanders and Sacramento Orcutt grass. Vernal pool habitats occupy areas with specific soil, geology and microtopography, making them highly susceptible to degradation from ground-disturbing activities. Many vernal pool areas contain hardpan soils that, if disturbed, will no longer hold water appropriately. Vernal pools also rely on runoff from surrounding areas during winter rains to refill. Regrading these areas may affect the flow of water and alter the amount of water entering the vernal pool. These activities, as well as effects from erosion, dust, and construction activities may temporarily or permanently alter vernal pool habitat, making such areas less suitable for the covered species occupying the habitat.

Vernal pool species are especially vulnerable to alterations in the existing hydrology of vernal pool habitats, because the timing, water depth, and inundation period determines which vernal-pool plants and branchiopods are able to reproduce and persist in a given vernal pool. For example,

indirect alterations to the hydrology of vernal pool habitats can result in too little soil moisture for the germination of plant seeds or hatching of vernal pool branchiopod eggs. Indirect alterations to the hydrology of vernal pool habitats may also cause vernal pools to dry too fast, or cause vernal pool water temperatures to increase too soon for a vernal pool species to complete its lifecycle and reproduce.

This programmatic biological opinion does not cover proposed projects that involve placement of fill material in, or excavation of, any vernal pools (wet or dry) as this will require a separate section 7 consultation. However, grading, excavation and filling outside of a vernal pools may have indirect effects on vernal swales and vernal complexes by altering the natural hydrology either upstream or downstream. This can cause unseasonal drying or flooding that can negatively affect species that occupy vernal pool habitats, which can lead to species unable to complete their life cycle. Upland habitat and swales around a vernal pool and within a vernal pool complex are essential to the hydrological and biological integrity of the vernal pool and complex. Typically, if any portion of a vernal pool is affected, then the entire vernal pool is considered affected. Where the reach of these indirect effects cannot be determined definitively, the Service considers most activities in areas within 250 feet of a vernal pool to be indirectly affected.

In addition to the proposed general conservation measures, implementing the proposed species-specific conservation measures will minimize adverse effects. These proposed conservation measures include pre-construction surveys, construction monitoring by a Service-approved biologist, establishing construction work windows and activity buffers, and identifying and flagging sensitive areas. Mortality-related effects will be minimized by requiring work within 250 feet of vernal pool habitat be avoided to the maximum extent possible and, if it does occur, to happen only in the dry season and to have no permanent adverse effects to hydrology of the pools or the pool complex. The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Effects from Dewatering, and Capture and Relocation of Aquatic Species

Proposed projects may involve dewatering and capture and relocation in waters occupied by covered species. Projects involving in-water work may require dewatering to properly install structures. In general, gravity conveyance via cofferdams and pipe systems is preferred when diversion of live-stream flows is necessary. However, in some cases pumps may be needed. If a pump is used, Subapplicants will screen the pump using an appropriate screen size for the target species to prevent entrainment, refer to species-specific conservation measures for appropriate screen sizes.

Dewatering, capture, and relocation of a covered species may reduce the magnitude of take and other effects when conducting in-water work. In such cases, implementing the proposed conservation measures will minimize the short-term adverse effects of such actions. Screening pump intakes as proposed in the species-specific conservation measures will reduce the probability that California red-legged frog tadpoles get caught in the inflow. Intakes will be completely screened with wire mesh no larger than indicated in the species-specific conservation measures and the intake will be placed within a perforated bucket or other method to attenuate suction to prevent species from entering the pump system. Temporary dewatering structures will be left in place for the minimum amount of time necessary for construction to allow covered aquatic species to return to the habitat.

Capture and relocation may cause mortality of a small number of individuals. Although the mortality rate associated with capture and relocation is typically low, relocated individuals are subject to stress and injury or death from the handling associated with relocation.

Temporary dewatering of creeks, ponds, or wetlands may harm or kill giant garter snake adults or young if they are not able to move on their own into nearby suitable habitat. Giant garter snakes that leave a construction area may move away from shelter and be more susceptible to injury and mortality from predation and vehicular or foot traffic. Displaced snakes may experience increased competition from animals in adjacent areas. Temporary dewatering of creeks, ponds, or wetlands may harm or kill California red-legged frog adults, larvae and eggs if they are not translocated to suitable habitat. Tadpoles may be injured or killed if entrained by pump or water diversion intakes. Chytrid fungi may be spread to California red-legged frogs and California tiger salamanders during capture and relocation if done without proper handling techniques and practices. Dewatering may strand, kill or injure California freshwater shrimp. They are small, inconspicuous and can take cover in areas that are difficult for a biologist to fully inspect. Shrimp may also be entrained by water pump systems and be injured or die. Injury and mortality may also occur to California freshwater shrimp during capture and relocation due to their fragile and delicate nature.

The short-term adverse effects of relocation will be minimized by implementing the proposed conservation measures. Only Service-approved biologists, using the most recent Service guidelines for relocation methods, will conduct capture and relocation. The Service-approved biologist will take precautions to prevent the introduction of amphibian diseases such as chytrid fungus in accordance with the Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander (Service 2003c). Disinfecting equipment and clothing is especially important when biologists are coming to the Action Area to handle amphibians after working in other aquatic habitats. California red-legged frogs and the California tiger salamanders will also be handled and assessed according to the Restraint and Handling of Live Amphibians (USGS National Wildlife Health Center 2001). The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Effects to Terrestrial Species

The following effects are primarily applicable to covered terrestrial species, which includes California red-legged frog, California tiger salamander, giant garter snake, Alameda whipsnake, Bay checkerspot butterfly, callippe silverspot butterfly, Myrtle's silverspot butterfly, and least Bell's vireo. These effects are also applicable to terrestrial habitats utilized by covered amphibians.

Habitat Disturbances, Noise, and Vibration

Noise and vibration associated with construction work may adversely affect many of the covered species. The movement and operation of heavy equipment during Subapplicants' proposed project activities, such as vibratory pile driving, impact pile driving, drilling, cutting, or excavation can have indirect effects on covered species by increasing ambient noise and vibration. Noise and vibration may affect covered species' breeding, foraging, and dispersal behavior. Noise and vibration from project activities may adversely affect covered birds, resulting in nest abandonment, fleeing, and temporary cessation of feeding or courtship behaviors. Additionally, this could impact future population sizes and connectivity of metapopulations. However, in many cases, these effects will be temporary in nature and likely limited to the construction period.

Work activities, including noise and vibration, may cause all terrestrial species to leave the work area. This disturbance may increase the likelihood for covered species vulnerability to predation or desiccation. Alameda whipsnakes and giant garter snakes may be harmed as a result of noise and

vibration associated with construction work; individuals displaced from protective cover are subject to predation and accidental death or injury from vehicular or foot traffic as they move across the landscape to avoid the area. Displaced snakes also may experience increased competition from animals in adjacent areas. Nesting birds, such as the least Bell's vireo may be flushed from nesting areas, abandoning nests and young in response to significant noise disturbance. Eggs and young are more vulnerable to predation when adults are flushed from nests. Construction-related noise can also adversely affect covered butterfly species, by startling them away from a safe area thus making them more vulnerable to collisions with vehicles and equipment and predation by other species.

Projects that require lighting could result in direct and indirect effects on the covered species. Direct effects to covered bird species will be primarily associated with changes in behavior. Lights may cause disruption, such as disorientation, in local, seasonal, or long-distance dispersal or migration events. These effects may be temporary or permanent, and may alter breeding or foraging behaviors, or affect the ability of species to find or return to breeding territories. Lighting structures provide raptor roosting sites which can lead to indirect effects to the giant garter snake by making them more vulnerable to predation when dispersing or basking.

The potential for disturbance and displacement of California red-legged frogs, California tiger salamanders and other covered species will be minimized by implementing Conservation Measures that require onsite biological monitoring, worker education programs, and successful capture and relocation of individuals. The likelihood of disturbance and displacement will be further reduced by avoidance, when feasible, of California red-legged frog and central California tiger salamander aquatic and upland habitat, as proposed. Conservation measures that minimize the area disturbed by project-related activities will reduce the potential for fleeing and abandonment as a result of the action, as will the requirement to work outside of the nesting season.

Barriers to Migration and Movement

Barriers to migration and movement may be temporary (during construction) or permanent and could result in partial or localized blockage of covered species migration or movement. Effects to covered species migration or movement could differ depending on the covered species, timing, and size of the project and the nature of the activity. Such barriers could result from activities such as the conversion of land to unsuitable habitat; the loss of suitable habitat associated with vegetation management; or the repair, replacement, or construction of new highways, walls, or other infrastructure. The California tiger salamander is dependent on barrier-free landscapes for successful migration and dispersal. Therefore, these types of new barriers will reduce connectivity of the metapopulation, isolating subpopulations making them more vulnerable to stochastic events and less likely to be recolonized if extirpated.

Most proposed projects are either associated with existing infrastructure, expected to be small in scale, and/or localized; therefore, these effects are not expected to significantly change the baseline conditions present in the Action Areas. Instead, the effects of barriers to covered species migration and movement may be incrementally altered. In some instances, these alterations may improve the existing conditions and, in others, may decrease the ability for species to freely move between habitats. In general, partial or complete barriers may directly affect a species' breeding, foraging, and dispersal behaviors. Barriers may restrict movement, alter or restrict access to key habitats, or result in entrainment, injury, or mortality. Barriers may adversely affect species' dispersal behaviors, which are important to continue genetic mixing in a population. Loss or impairment of this function may result in population isolation or in population sinks or extirpation.

Implementation of proposed conservation measures will reduce the footprint associated with the work area, access road and staging areas within certain habitats, and areas commonly used as wildlife movement corridors.

Trampling, Crushing or Entrapment

Activities involving vegetation clearing, earth moving, pipeline installation, and other construction may adversely affect covered species through trampling, crushing or entrapment within natural and artificial structures. Natural structures may include mammal burrows, rubble piles, rock outcrops and root wads. Artificial structures include trenches, pipes, and construction equipment.

Direct effects associated with entrapment include injury and mortality. Excavation, movement or depositing of materials above natural structures may entrap covered species resulting in harm, injury, or mortality. Covered species such as California red-legged frogs, California tiger salamanders or Alameda whipsnakes may fall into an excavated trench and subsequently be buried or physically removed. These same covered species may occupy a pipe or construction equipment and be subject to take through direct handling and removal by construction personnel or biologist, movement of construction equipment or materials, and burial of construction material or pipe. Some of the effects associated entrapment may be temporary, such as physical handling and movement or falling into a trench, while other effects such as burial or movement of construction equipment and material may be permanent and lethal.

Direct effects on all covered species as a result of a proposed project includes injury or mortality from being crushed by equipment, maintenance materials, or worker foot traffic. Equipment, vehicles, and personnel working in open, upland grassland habitats may injure, or kill all life stages of covered butterfly species. Chrysalides, larvae, adults, and their larval host plants may be crushed or buried, and adults may be injured or killed by collisions with construction equipment. Species that take refuge in burrows such as California red-legged frog and California tiger salamander, and rocks and crevices such as the Alameda whipsnake, are highly vulnerable to crushing in their refugia or when they leave their refugia in response to disturbance.

These effects will be reduced by the proposed conservation measures, including minimizing and clearly demarcating the boundaries of activity areas, pre-construction surveys, and the presence of a Service-approved biologist during construction activities who will have the authority to halt work activities until the animal leaves the area on its own. Construction-related disturbance to butterfly host plants and breeding adults will be avoided and minimized through pre-construction surveys, biological monitors, and appropriate buffers around host plants and hilltop breeding areas as well as implementing seasonal limitations for work in breeding areas. Adverse effects to Alameda whipsnake will be minimized by avoiding rock outcroppings and scrub habitats, limiting the timing of activities to the summer and early fall to avoid disturbance to breeding and young, and removing vegetation by hand in areas with shrub vegetation.

Inadvertent entrapment will be avoided by covering all excavated, steep-walled trenches and holes greater than 6 inches at the end of each workday, or providing escape ramps. Relocating listed species out of harm's way, as proposed, may further minimize injury or mortality. The potential for uninformed workers to disturb, injure, or kill covered species will be greatly reduced by proposed education of workers as to the presence and protected status of species and the measures that will be implemented to protect it during work activities.

Critical Habitat

As described above, the Action Area encompasses the entire SFWO's jurisdiction and all critical habitat units within the SFWO's jurisdiction for the California red-legged frog, California tiger salamander (Central and Sonoma DPSs), Alameda whipsnake, tidewater goby, valley elderberry longhorn beetle, Bay checkerspot butterfly, vernal pool fairy shrimp, vernal pool tadpole fairy shrimp, conservancy fairy shrimp, longhorn fairy shrimp, and Sacramento Orcutt grass. The Service anticipates that projects funded by FEMA could negatively affect some of the critical habitat units and PBFs for these species within the Action Area.

California Red-Legged Frog
The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1 (aquatic breeding habitat), PBF 2 (non-breeding aquatic habitat), PBF 3 (upland habitat), and PBF 4 (dispersal habitat) of the California red-legged frog critical habitat within the Action Area. However, these activities will likely result in minor effects to habitat as most projects will restore the area to pre-disaster conditions. The Action Area contains aquatic breeding and non-breeding habitat (PBFs 1 and 2) in the form of ponds, creeks, and streams. This habitat could be affected by construction activities through erosion from project activities such as culvert replacement, though following conservation measures will minimize these effects. However, constructing flood control structures such as levees could channelize the applicable waterway permanently affecting the PBFs making them less suitable for the California red-legged frog. Some permanent activities are proposed such as constructing new facilities or relocating existing facilities outside of disaster prone areas. These activities will permanently affect upland and dispersal habitat (PBFs 3 and 4) by installing structures on high quality habitat which will remove upland areas for the California red-legged frog to hide and will create barriers to movement to and from aquatic areas. However, the footprint of the project will confine these effects to a small area. When implemented with both the general and species-specific conservation measures, these proposed activities will not prevent critical habitat from providing essential conservation values for the California red-legged frog.

California Tiger Salamander (Central California and Sonoma DPSs)
The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1 (aquatic breeding habitat), PBF 2 (upland habitat), and PBF 3 (dispersal habitat) of the California tiger salamander critical habitat within the Action Area. However, these activities will likely result in minor effects to habitat as most projects will restore the area to pre-disaster conditions. Activities with a larger effect are those that will construct new facilities such as developing demonstration projects. These projects have to potential to fill aquatic breeding habitat (PBF 1), excavate and fill burrow systems (PBF 2), and construct barriers that prevent movement to and from breeding sites (PBF 3). When implemented with both the general and species-specific conservation measures, these activities will not prevent critical habitat from providing essential conservation values for the California tiger salamander.

Alameda Whipsnake
The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1 (scrub/shrub community), PBF 2 (woodland/grassland community), and PBF 3 (rock outcrops) of the Alameda whipsnake critical habitat within the Action Area. However, these activities will likely result in minor effects to habitat as most projects will restore the area to pre-disaster conditions. Activities such as realigning roads around disaster areas could affect all three PBFs by permanently removing them and creating a paved road. As most of the activities are water related, the number of projects affecting Alameda whipsnake critical habitat will be small. When

implemented with both the general and species-specific conservation measures, these activities will not prevent critical habitat from providing essential conservation values for the Alameda whipsnake.

Tidewater Goby
The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1a (substrate), PBF 1b (aquatic vegetation), PBF 1c (sandbars) of the tidewater goby critical habitat within the Action Area. However, these activities will likely result in minor effects to habitat as most projects will restore the area to pre-disaster conditions. As the specific PBFs are flexible depending on the water level, repairing coastal features such as coastal flood-control structures could affect the PBFs by shrinking the amount of available habitat that fall within the PBFs should the repair extend outside of the original footprint. When implemented with both the general and species-specific conservation measures, these activities will not prevent critical habitat from providing essential conservation values for the tidewater goby.

Valley Elderberry Longhorn Beetle
The designated critical habitat for the valley elderberry longhorn beetle is limited to a small geographical area along the American River in Sacramento County, and the adverse effects from activities on critical habitat will be minimal. Activities associated with the proposed action could negatively affect critical habitat of the valley elderberry longhorn beetle within the Action Area. Given the location and size of the valley elderberry longhorn beetle critical habitat, the Service does not anticipate effects to critical habitat by Subapplicants. However, if activities occur in critical habitat they will only result in minor effects to habitat, and these activities, when implemented with both the general and species-specific conservation measures, will not prevent critical habitat from providing essential conservation values for the valley elderberry longhorn beetle.

Bay Checkerspot Butterfly
The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1 (grass land community), PBF 2 (host plant), PBF 3 (nectar source), PBF 4 (soil type), and PBF 5 (shelter) of the Bay checkerspot butterfly critical habitat within the Action Area. However, these activities will likely only result in minor effects to habitat as most projects will restore the area to pre-disaster conditions. The repair of roads that run through critical habitat after a disaster could pose a risk to all PBFs. Depending on the timing of repairs, PBF 5 could be most affected during the summer months of the Bay checkerspot butterfly summer diapause. However, the projects footprint will confine these effects to a small area. When implemented with both the general and species-specific conservation measures, these activities will not prevent critical habitat from providing essential conservation values for the Bay checkerspot butterfly.

Vernal Pool Branchiopods
The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1 (topographic features), PBF 2 (depressional features), PBF 3 (food sources), and PBF 4 (shelter) of the vernal pool branchiopods critical habitat within the Action Area. However, these activities will likely only result in minor effects to habitat as most projects will restore the area to pre-disaster conditions. Activities associated with the proposed action could negatively impact all four PBFs if activities are located adjacent to vernal pool branchiopod critical habitat. The habitat could be affected by construction activities that divert extra water to or from the vernal pool critical habitat. Altering the topography of adjacent sites could negatively impact PBF 2 by altering the frequency and duration of filling. Additionally, this change could affect prey species (PBF 3) and vernal pool plants that provide shelter (PBF 4). However, project footprints will confine these effects to a small area. When implemented with both the general and species-specific conservation measures, these activities will not prevent critical habitat from providing essential conservation

values for the vernal pool branchiopods.

Sacramento Orcutt Grass

The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1 (topographic features) and PBF 2 (depressional features) of the Sacramento Orcutt grass critical habitat within the Action Area. However, these activities will likely only result in minor effects to habitat as most projects will restore the area to pre-disaster conditions. Similar to affect to vernal pool branchiopod critical habitat. Sacramento Orcutt grass will be affected by project activities adjacent to critical habitat, which will affect both PBF 1 and PBF 2. However, project footprints will confine these effects to a small area. When implemented with both the general and species-specific conservation measures, these activities will not prevent critical habitat from providing essential conservation values for the Sacramento Orcutt grass.

Most of the covered activities will only result in minor effects limited to small areas. These activities are not likely to diminish the quality of PBFs in a unit for any of the covered species critical habitat. While disturbance within critical habitat may prevent some covered species from using portions of the critical habitat for essential life function whether temporarily or permanently, they will still be able to complete their essential ecological and biological functions in the remaining areas of critical habitat. Therefore, all critical habitat units will retain their PBFs and the PBFs within each critical habitat unit for each covered species will still remain functional. Consequently, the designated critical habitat for all covered species will still be able to perform its intended functions and conservation role.

In conclusion, the Service determines that the majority of activities associated with any proposed projects will result in only minor effects to PBFs, and with implementation of the conservation measures, will not prevent critical habitat from providing essential conservation values. The restoration of native vegetation, removing invasive species, improving water quality and hydrology, stabilizing eroding banks, reducing sedimentation, replacing structures that form partial or complete barriers to movement, and vegetation management to reduce wildfire risk will have negligible or beneficial effects to critical habitat. This determination is further based on the fact that projects funded by FEMA primarily will occur in previously disturbed areas, and the project footprint of most individual projects will be small in size and impact. The Service anticipates that habitat loss and degradation at individual project sites will be minimal and implementation of conservation measures will further minimize effects.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area considered in this programmatic biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The following actions may affect the species covered in this programmatic biological opinion by directly or indirectly harming individuals or by adversely affecting designated or proposed critical habitats.

An undetermined number of future land use conversions and routine land management practices frequently are not reviewed for environmental compliance under the federal permitting process. These activities may alter the habitat or increase incidental take of federally-listed species and are cumulative to the proposed programmatic actions. However, due to the large area covered under this programmatic biological opinion, the Service is unable to provide specific information to determine cumulative effects.

Conclusion

After reviewing the current status of the 16 animal and one plant species covered by this programmatic biological opinion, the species' status and environmental baseline for the Action Area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that FEMA's Disaster, Mitigation, and Preparedness Program in California, as proposed, is not likely to jeopardize the continued existence of the following species:

California red-legged frog (*Rana draytonii*)
California tiger salamander (*Ambystoma californiense*)
- Central California DPS
- Sonoma DPS

Giant garter snake (*Thamnophis gigas*)
Alameda whipsnake (*Masticophis lateralis euryxanthus)*
Least bell's vireo (*Vireo bellii pusillus*)
Tidewater goby (*Eucyclogobius newberryi*)
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)
California freshwater shrimp (*Syncaris pacifica*)
Bay checkerspot butterfly (*Euphydryas editha bayensis*)
Callippe silverspot butterfly (*Speyeria callippe callippe*)
Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*)
Vernal pool fairy shrimp (*Branchinecta lynchi*)
Vernal pool tadpole shrimp (*Lepidurus packardi*)
Conservancy fairy shrimp (*Branchinecta conservatio*)
Longhorn fairy shrimp (*Branchinecta longiantenna*)
Sacramento Orcutt grass (*Orcuttia viscida*)

The Service reached this conclusion because the project-related effects to the species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of the species based on the following: (1) FEMA, in coordination with the Service, has proposed an extensive suite of general and species-specific conservation measures to be implemented for each project that are directed towards the protection of the habitat and, therefore, the long-term protection of individual species; (2) most individual project areas will have small footprints (less than one acre), therefore, not all populations or habitats will be affected by the proposed actions; and (3) FEMA will initiate individual section 7 consultations on all actions involving species and projects that do not specifically qualify for coverage under this programmatic biological opinion, as described in the programmatic biological assessment.

Critical habitat is designated for 13 species covered by this programmatic biological opinion. After reviewing the current status of designated critical habitat for these species, the environmental baseline for the Action Area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that FEMA's Disaster, Mitigation, and Preparedness Program in California, as proposed, is not likely to destroy or adversely modify designated critical habitat for the following species:

California red-legged frog (*Rana draytonii*)
California tiger salamander (*Ambystoma californiense*)
- Central California DPS

- Sonoma DPS

Alameda whipsnake (*Masticophis lateralis euryxanthus*)
Least bell's vireo (*Vireo bellii pusillus*)
Tidewater goby (*Eucyclogobius newberryi*)
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)
Bay checkerspot butterfly (*Euphydryas editha bayensis*)
Vernal pool fairy shrimp (*Branchinecta lynchi*)
Vernal pool tadpole shrimp (*Lepidurus packardi*)
Conservancy fairy shrimp (*Branchinecta conservatio*)
Longhorn fairy shrimp (*Branchinecta longiantenna*)
Sacramento Orcutt grass (*Orcuttia viscida*)

The Service reached this conclusion because the project-related effects to the designated critical habitat for these 13 species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding the function of the critical habitat to serve its intended conservation role for the species based on the following: (1) FEMA, in coordination with the Service, has proposed an extensive suite of general and species-specific conservation measures that will be implemented for each project; (2) the majority of the effects of the projects are temporary and not persistent; (3) most of the projects restore structures such as roads, bridges, or other pre-existing facilities that are not in themselves physical and biological features essential to species' conservation; and (4) the effects to critical habitat for these 13 species are small and discrete, relative to the entire area designated, and are not expected to appreciably diminish the value of the critical habitat or prevent it from sustaining its role in the conservation of these species.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by FEMA so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. FEMA has a continuing duty to regulate the activity covered by this incidental take statement. If FEMA (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, FEMA must report the progress of the action and its impact on the species to the Service as

specified in the incidental take statement [50 CFR §402.14(i)(3)].

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally-listed endangered plants or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

Amount or Extent of Take

The Service is providing mechanisms to quantify when we consider take of the 16 covered animal species to be exceeded as a result of implementing the proposed project. We will use the following detections of injured or dead individuals per project site, total per year and total for the 5-year duration of this programmatic biological opinion. The detection of injured or dead individuals may indicate that species' utilization of habitat within the Action Area has changed over the lifetime of the project. By setting these thresholds, we have set an incidental take limit that is measureable, irrefutable and indicates that the species are being affected at a level where avoidance and minimization measures and project implementation need to be evaluated and possibly modified.

California Red-legged Frog

The Service is authorizing take incidental to the proposed action as the injury or fatality of no more than three juvenile or adult California red-legged frogs per site per year, no more than 30 juveniles or adult California red-legged frogs total for all sites per year, and no more than 150 juvenile or adult California red-legged frogs for the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) of California red-legged frogs will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. death or injury of more than three juvenile or adult California red-legged frogs per site per year;
2. death or injury of more than 30 juveniles or adults total for all sites per year; or
3. death or injury of more than 150 juveniles or adults, as detected during the 5-year duration of the programmatic biological opinion by the FEMA Subapplicants, biological monitors, or other personnel.

Central California Tiger Salamander

The Service is authorizing take incidental to the proposed action as the injury or fatality of no more than three juvenile or adult central California tiger salamanders per site per year, no more than 30 juvenile or adult central California tiger salamanders total for all sites per year, and no more than 150 juvenile or adult central California tiger salamanders for the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) of central California tiger salamanders will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. death or injury of more than three juvenile or adult central California tiger salamanders per site per year;
2. death or injury of more than 30 juvenile or adult central California tiger salamanders total for all sites per year; or
3. death or injury of more than 150 juvenile or adult central California tiger salamanders during the 5-year duration of the programmatic biological opinion, as detected by the FEMA Subapplicants, biological monitors, or other personnel.

Sonoma California Tiger Salamander

The Service is authorizing take incidental to the proposed action as the injury or fatality of no more than one juvenile or adult Sonoma California tiger salamander per site per year, no more than 15 juvenile or adult Sonoma California tiger salamanders total for all sites per year, and no more than 75 juvenile or adult Sonoma California tiger salamanders for the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) of Sonoma California tiger salamanders will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. death or injury of more than one juvenile or adult Sonoma California tiger salamander per site per year;
2. death or injury of more than 15 juveniles or adult Sonoma California tiger salamanders total for all sites per year; or
3. death or injury of more than 75 juvenile or adult Sonoma California tiger salamanders during the 5-year duration of the programmatic biological opinion, as detected by the FEMA Subapplicants, biological monitors, or other personnel.

Giant Garter Snake

The Service is authorizing take incidental to the proposed action as the injury or fatality of no more than three juvenile or adult giant garter snakes per site per year, no more than 30 juvenile or adult giant garter snakes total for all sites per year, and no more than 150 juvenile or adult giant garter snakes for the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) of giant garter snakes will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. death or injury of more than three juvenile or adult giant garter snake per site per year;
2. death or injury of more than 15 juvenile or adult giant garter snakes total for all sites per year; or
3. death or injury of more than 75 juvenile or adult giant garter snakes during the 5-year duration of the programmatic biological opinion, as detected by the FEMA Subapplicants, biological monitors, or other personnel.

Least Bell's Vireo

The Service anticipates that incidental take of the least Bell's vireo associated with FEMA's proposed action will be difficult to detect or quantify because the species will be difficult, if not impossible, to detect at any given project site. Providing a meaningful number for incidental take is difficult because a surveyor can only count what they see. Least Bell's vireo are small, secretive, and occur in habitats that make detection difficult, thereby making them nearly impossible to locate during pre-activity survey efforts. Under such conditions, finding a dead or injured individual vireo is unlikely within a project activity area, or mortality may be masked by seasonal fluctuations in numbers and migration. In addition, in most cases there have been no prior formal surveys in areas where projects are likely to occur. There is a risk of harm, injury and mortality as a result of the proposed activities and the permanent and temporary loss or degradation of suitable habitat; however, proper implementation of general and species-specific conservation measures should be effective in preventing incidental take due to harm, injury, or mortality. If a single individual is killed or injured, there is no means of equating one dead or injured animal (assuming one was found) to a number of dead or injured animals not observed.

Since we cannot estimate the number of individual least Bell's vireo that will be incidentally taken for the reasons listed above, the Service is providing a mechanism (acres) to quantify when we will consider take to be exceeded as a result of the proposed project. Since we expect take to result from the proposed project's effects to habitat, the quantification of habitat becomes a direct surrogate for the species that will be taken. Therefore, the Service anticipates that all least Bell's vireo inhabiting individual project footprints within the Action Area will be subject to incidental take in the form of non-lethal harm in terms of habitat only. No other forms of take are authorized. The Service anticipates and is authorizing the take of not more than one acre of actual habitat at any given project site that is less than 20 acres or no more than five percent of habitat at a particular site that is 20 acres or greater. This five percent at a particular site cannot represent more than five percent of the entire range of a covered species, for the five-year term of the programmatic biological opinion.

Accordingly, the Service concludes that the incidental take of least Bell's vireo will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. more than 1 acre of actual habitat at any given project site that is less than 20 acres is taken;
2. more than 5 percent of habitat at a particular site that is 20 acres or greater is taken; or
3. if this 5 percent at a particular site represents more than 5 percent of the entire range of a covered species is taken, for the 5-year term of the programmatic biological opinion.

Valley Elderberry Longhorn Beetle

The Service anticipates incidental take of the valley elderberry longhorn beetle will be difficult to detect or quantify. The cryptic nature of this species and their relatively small body size make finding a dead specimen unlikely. The species' occurrences within its habitat make them difficult to detect. Due to the difficulty in quantifying the number of dead or injured individual beetles that will be taken as a result of the proposed action, the Service is quantifying take incidental to the proposed action as the number of elderberry shrubs with stems one inch or greater in diameter at ground level (VELB habitat) that may become unsuitable for valley elderberry long horn beetles due to direct and indirect effects as a result of the proposed project. Therefore, the Service anticipates that all valley elderberry longhorn beetles inhabiting elderberry shrubs containing stems 1-inch or greater in diameter at ground level within

individual project action areas will be harmed or killed as a result of the proposed action. The Service is not further quantifying take (injury or fatality) of actual individual beetles or their larvae incidental to the proposed action.

Since we cannot estimate the number of individual valley elderberry longhorn beetles that will be incidentally taken for the reasons listed above, the Service is providing a mechanism (acres) to quantify when we will consider take to be exceeded as a result of the proposed project. Since we expect take to result from the proposed project's effects to habitat, the quantification of habitat becomes a direct surrogate for the species that will be taken. Therefore, the Service anticipates that all valley elderberry longhorn beetles inhabiting individual project footprints within the Action Area will be subject to incidental take in the form of non-lethal harm and harassment. The Service anticipates and is authorizing the take of not more than one acre of actual habitat at any given project site that is less than 20 acres or no more than five percent of habitat at a particular site that is 20 acres or greater. This five percent at a particular site cannot represent more than five percent of the entire range of a covered species, for the five-year term of the programmatic biological opinion.

Accordingly, the Service concludes that the incidental take of valley elderberry longhorn beetle will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. more than 1 acre of actual habitat at any given project site that is less than 20 acres is taken;
2. more than 5 percent of habitat at a particular site that is 20 acres or greater is taken; or
3. if this 5 percent at a particular site represents more than 5 percent of the entire range of a covered species is taken, for the 5-year term of the programmatic biological opinion.

<u>California Freshwater Shrimp</u>

The Service is authorizing take incidental to the proposed action as the injury or fatality of no more than two individual California freshwater shrimp if less than 20 are captured or no more that 5 percent of total individuals captured if more than 20 shrimp are captured per year, for the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) of California freshwater shrimp will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. death or injury of more than two individual California freshwater shrimp per site if less than 20 are captured; or
2. death or injury of more that 5 percent of total individuals captured per site if more than 20 shrimp are captured per year, for the 5-year duration of the programmatic, as detected by the FEMA Subapplicants, biological monitors, or other personnel.

<u>Tidewater Goby</u>

The Service anticipates that take of the tidewater goby may occur as a result of the proposed projects in and around tidewater goby habitat, but it will be difficult to detect due to the species population dynamics, life history, and ecology. The exact number of individuals taken will be difficult to quantify because tidewater goby population sizes fluctuate greatly seasonally and year-to-year and the number of occupied localities and locations varies with seasonal and stochastic events. The Service is authorizing take incidental to the proposed action in the form of capture and

relocation and take incidental to the proposed project actions in the form of death or injury of up to five percent of individuals captured and relocated per site per year, 10 percent of the estimated population as a result of project activities per site per year, and up to five percent of the estimated populations as a result of all projects per year and for the 5-year duration of the programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) of the tidewater goby will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. death or injury of up to 5 percent captured and relocated individuals per site per year;
2. death or injury of up to 10 percent of the estimated population as a result of project activities per site per year; and
3. death or injury of up to 5 percent of the estimated populations as a result of all projects per year and for the 5-year duration of the programmatic biological opinion.

Bay Checkerspot Butterfly, Myrtle's Blue Butterfly, Callippe Silverspot Butterfly

The Service anticipates that incidental take of the Bay checkerspot butterfly, Myrtle's silverspot butterfly and Callippe silverspot butterfly (three butterfly species) will be difficult to detect because most take will likely occur to larvae and chrysalis pupae that are on host plants, lying on the ground or underneath a plant. The finding of a damaged or crushed individual larva or chrysalis is unlikely because of its relatively small size. Adults may be killed by mechanized equipment while flying through the project area; loss of individuals of these three butterfly species also may be difficult to quantify due to their small size. However, while small, these adults are more likely to be detected than larvae or chrysalises. The Service anticipates and is authorizing a maximum of two adults of each of these three butterfly species per site per year and no more than 30 adults of each of these three butterfly species total for all sites for the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) of the Bay checkerspot butterfly, Myrtle's silverspot butterfly and Callippe silverspot butterfly will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. Death or injury of more than two individual adults of each of these three butterfly species per site per year or
2. Death or injury of more than 30 individual adults of each of these three butterfly species, for the 5-year duration of this programmatic biological opinion, as detected by the FEMA Subapplicants, biological monitors, or other personnel.

Alameda Whipsnake

The Service anticipates and is authorizing take incidental to the proposed action as the injury or fatality of no more than one juvenile or adult Alameda whipsnake per year and no more than five juvenile or adult Alameda whipsnakes during the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take of Alameda whipsnake will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. more than five dead or injured juvenile or adult individual Alameda whipsnakes total for all sites per year; or
2. more than 25 dead or injured juvenile or adult individual Alameda whipsnakes total for all sites during the 5-year duration of the programmatic biological opinion, as detected by the FEMA Subapplicants, biological monitors, or other personnel.

Vernal Pool Branchiopods

It is not meaningful to provide numbers for incidental take of individual conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, and longhorn fairy shrimp (collectively, vernal pool branchiopods) associated with this action because a surveyor only can count what they can see and there is much that they cannot see under the water and within the soil. Even in locations actually occupied by the species, it is possible for surveyors to miss adults, juveniles and eggs, particularly given the opportunistic and precipitation-driven life history of these species and the large size of the Action Area. All of these factors result in even the most experienced vernal pool branchiopod biologist being unable to show that any estimated take occurred or did not occur at the site. If a single individual vernal pool branchiopod has been killed or injured, there is no means of equating one dead or injured branchiopod (assuming one was found) to a number of dead or injured branchiopods not observed. Furthermore, the likelihood of detecting an injured or dead vernal pool branchiopod is extremely low due to their very small size and cryptic life history. Therefore, the Service is not quantifying take incidental to the proposed action as the injury or fatality in terms of individual animals. Incidental take for this species is provided only in terms of habitat, as described above.

Since we cannot estimate the number of individual vernal pool branchiopods that will be incidentally taken for the reasons listed above, the Service is providing a mechanism (acres) to quantify when we will consider take to be exceeded as a result of the proposed project. Since we expect take to result from the proposed project's effects to habitat, the quantification of habitat becomes a direct surrogate for the species that will be taken. Therefore, the Service anticipates that all vernal pool branchiopods inhabiting individual project footprints within the Action Area will be subject to incidental take in the form of non-lethal harm and harassment. The Service anticipates and is authorizing the take of not more than 1 acre of actual habitat at any given project site that is less than 20 acres or no more than five percent of habitat at a particular site that is 20 acres or greater. This five percent at a particular site cannot represent more than five percent of the entire range of a covered species, for the five-year term of the programmatic biological opinion.

Accordingly, the Service concludes that the incidental take of vernal pool branchiopods will be considered exceeded if one or more of the following conditions are met. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation will be required.

1. more than 1 acre of actual habitat at any given project site that is less than 20 acres is taken;
2. more than 5 percent of habitat at a particular site that is 20 acres or greater is taken; or
3. if this 5 percent at a particular site represents more than 5 percent of the entire range of a covered species is taken, for the 5-year term of the programmatic biological opinion.

Upon implementation of the following reasonable and prudent measures, incidental take of these 17 animal species associated with FEMA's Disaster, Mitigation, and Preparedness Program in California, will become exempt from the prohibitions described in section 9 of the Act. No other forms of take are exempted under this programmatic biological opinion.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species covered by this programmatic biological opinion, or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

The Service has determined the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of these 16 species:

1. FEMA and their Subapplicants shall fully implement and adhere to all general avoidance and minimization measures and species-specific conservation measures, as described in the programmatic biological assessment and restated here in the Description of the Proposed Programmatic Actions section of this programmatic biological opinion. Further, this reasonable and prudent measure shall be supplemented by the terms and conditions below.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the FEMA must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

1. FEMA shall require that all personnel and Subapplicants associated with this project are made aware of the general avoidance and minimization measures and species-specific conservation measures and their responsibility to implement them fully.

2. FEMA shall submit an annual report to the Service by March 15 summarizing all projects completed during the previous calendar year. These annual reports shall include a tabular summary of those projects and for each project:

    a) Subapplicant and project name;
    b) Project location with map or GIS shape file;
    c) Covered species impacted;
    d) Estimated acres of covered species' habitat affected (acres, linear feet, etc.), as stated in the ESA Review Form;
    e) Any other pertinent information that allows the Service to evaluate the causes and extent of habitat effects and any incidental taking that may have occurred that was not authorized in the Incidental Take Statement of this programmatic biological opinion.
    f) The annual report will also include a summary of acres of habitat taken and individuals injured or killed from all previous years.
    g) FEMA shall require that the Subapplicant to provide a copy of the project report to the Service and FEMA with the following project-specific details on its respective projects within 45 days of project construction completion:

i. Date the project was initiated and completed;
ii. Number of observed instances of injury or mortality of any covered species;
iii. Number of observations of live, uninjured individuals of any covered species;
iv. Pertinent information concerning the success of the project in meeting the conservation measures; and
v. An explanation of failure to meet such measures, if any.

3. FEMA Region IX shall attend an annual coordination meeting with the Service by May 15 each year to discuss the annual monitoring report and any adaptive management measures needed to minimize impacts.

4. FEMA or its Subapplicants shall immediately contact the Service's SFWO at (916) 414-6631 to report direct encounters between listed species and project workers and their equipment whereby incidental take in the form of harm, injury, or death occurs. If the encounter occurs after normal working hours, FEMA or its Subapplicants shall contact the SFWO at the earliest possible opportunity the next working day. When injured or killed individuals of the listed species are found, FEMA or its Subapplicants shall follow the steps outlined in the Salvage and Disposition of Individuals section below.

5. For those components of the action that will require the capture and relocation of any listed species, FEMA or its Subapplicant shall immediately SFWO at (916) 414-6631 to report the action. If capture and relocation need to occur after normal working hours, FEMA or its Subapplicant shall contact the SFWO at the earliest possible opportunity the next working day.

6. FEMA or its Subapplicants shall immediately contact the Service's SFWO at (916) 414-6631 to report any unauthorized take of federally-listed species occurs onsite, or if more than one (1) acre of habitat is adversely affected at a particular site as a result of implementation of the FEMA-funded action.

Salvage and Disposition of Individuals

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until the Service provides instructions regarding the disposition of the dead specimen. The Service contact persons are Kellie Berry or Gerry Cobian at the SFWO at (916) 414-6631.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following action:

1. Sightings of any listed and sensitive species encountered during FEMA-funded activities should be reported to the California Natural Diversity DataBase (CNDDB), California

Department of Fish and Wildlife.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation on FEMA's Disaster, Mitigation, and Preparedness Programs in California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required and shall be requested by the federal agency or by the Service where discretionary federal agency involvement or control over the action has been retained or is authorized by law and:

(a) If the amount or extent of taking specified in the incidental take statement is exceeded;
(b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
(c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or
(d) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions regarding this biological opinion, please contact Kellie Berry, Sacramento Valley Division Chief (kellie_berry@fws.gov) or Gerry Cobian, Fish and Wildlife Biologist (gerald_cobian@fws.gov) at the letterhead address or telephone (916) 414-6631.

Sincerely,

Jennifer M. Norris, Ph.D.
Field Supervisor

ec:
Ms. Nancy Haley, Chief, California North Section, U.S. Army Corps of Engineers
Mr. William Guthrie, Chief, California Delta Section, U.S. Army Corps of Engineers
Mr. Paul Maniccia, Chief, California South Section, U.S. Army Corps of Engineers

LITERATURE CITED

Backlin, A.R., J.Q. Richmond, E.A. Gallegos, C.K. Chistensen, and R.N. Fisher. 2017. An extirpated lineage of a threatened frog species resurfaces in southern California. Oryx: 1–5.

Barry, S. 1992. Letter to Marvin L. Plenert, Regional Director, U.S. Fish and Wildlife Service, Portland, Oregon, regarding proposed listing.

_____. 2002. Dobbins and Cottage/Deadwood Watersheds, Plumas National Forest, Herpetological Surveys, 2001-2002. Department of Zoology, University of California, Davis

Barry, S.J. and G.M. Fellers. 2013. History and status of the California red-legged frog (*Rana draytonii*) in the Sierra Nevada, California, USA. Herpetological Conservation and Biology 8(2): 456-502.

Bulger, J.B., N.J. Scott Jr., and R.B. Seymour. 2003. Terrestrial activity and conservation of adult California red-legged frogs *Rana aurora draytonii* in coastal forests and grasslands. Biological Conservation 110(2003): 85–95.

Bury, R.B. and J.A. Whelan. 1984. Ecology and management of the bullfrog. Fish and Wildlife Resource Publication 155.

California Department of Fish and Game (CDFG). 1998. California Wildlife Habitat Relationships. Wildlife and Habitat Data Analysis Branch. California Department of Fish and Game, State of California. http://www.dfg.ca.gov/whdab/htmllwildlife_habitats.html. Sacramento, California.

California Department of Fish and Wildlife (CDFW). 2017. California Natural Diversity Database. RAREFIND. Natural Heritage Division, Sacramento, California.

California Department of Fish and Wildlife (CDFW). 2018. California Natural Diversity Database. RAREFIND. Natural Heritage Division, Sacramento, California.

Cook, D.G, P.C. Trenham, and D. Stokes. 2005. Sonoma County California tiger salamander metapopulation, preserve requirements, and exotic predator study. Prepared for U. S. Fish and Wildlife Service, Sacramento, California. FWS Agreement No. 114203J110.

Davidson, E.W., M. Parris, J.O. Collins, J.E. Longcore, A.P. Pessier, and J. Brunner. 2003. Pathogenicity and transmission of *Chytridiomycosis* in tiger salamanders (*Ambystoma tigrinum*). Copeia 2003(3): 601-607.

Dodd, C.K. 2013a. Frogs of the United States and Canada. Volume 1. John Hopkins University Press, Baltimore, Maryland.

_____. 2013b. Frogs of the United States and Canada. Volume 2. John Hopkins University Press, Baltimore, Maryland.

Emlen, S.T. 1977. "Double clutching" and its possible significance in the bullfrog. Copeia 1977(4): 749-751.

Eriksen, C. and D. Belk. 1999. Fairy shrimps of California's puddles, pools, and playas. Mad River Press, Inc.; Eureka, California. 196 pp.

Eschmeyer, W.N., E.S. Herald, and H. Hamann. 1983. A field guide to Pacific coast fishes of North America. Houghton Mifflin Co., Boston, xxi + 336 pp.

Evans Mack, D., W.P. Ritchie, S.K. Nelson, E. Kuo-Harrison, P. Harrison and T.E. Hamer. 2003. Methods for surveying Marbled Murrelets in forests: a revised protocol for land management and research. Pacific Seabird Group unpublished document available at: http://www.pacificseabirdgroup.org.

Fellers, G. 2005. *Rana draytonii*, Baird and Girard, 1852b California red-legged frog. Pages 552-554 in M. Lannoo (editor). Amphibian declines the conservation status of United States species. University of California Press. Berkeley, California.

Fellers, G.M., and P.M. Kleeman. 2007. California Red-Legged Frog (*Rana draytonii*) Movement and Habitat Use: Implications for Conservation. Journal of Herpetology 41: 276-286.

Fellers, G.M., R.A. Cole, D.M. Reintz, and P.M. Kleeman. 2011. Amphibian chytrid fungus (*Batrachochytrium dendrobatidis*) in coastal and montane California, USA Anurans. Herpetological Conservation and Biology 6(3): 383-394.

Fellers, G.M., P.M. Fleeman, D.A.W. Miller, and B.J. Halstead. 2017. Population Trends, Survival, and Sampling Methodologies for a Population of *Rana draytonii*. Journal of Herpetology 51(4): 567-573.

Fisher, R.N. and H.B. Shaffer. The decline of amphibians in California's Great Central Valley. Conservation Biology 10(5): 1387-1397.

Fitzpatrick, B. M. an H. B. Shaffer. 2004. Environmental-Dependent Admixture Dynamics in a Tiger Salamander Hybrid Zone. Evolution 58(6): 1282-1293.

Franzreb, K.E. 1989. Ecology and conservation of the endangered least Bell's vireo. U.S. Fish and Wildlife Service, Biol. Rep 89(1). 17 pp.

Gordon, R. and J. Bennett. Electronic mail communication from Rebecca Gordon and Jesse Bennett, Service, Carlsbad FWO, to Valerie Hentges, Service, Sacramento FWO, dated October 12, 2017.

Habel, J.S. and G.A. Armstrong. 1977. Assessment and atlas of shoreline erosion along the California coast. California Department of Navigation and Ocean Development, vii + 277 pp.

Halstead, B.J. and P.M. Kleeman. 2017. Frogs on the Beach: Ecology of California red-legged frogs (*Rana draytonii*) in Coastal Dune Drainages. Herpetological Conservation and Biology 12: 127-140.

Halstead, B.J., S.M. Skalos, G.D. Wylie, and M.L. Casazza. 2015. Terrestrial Ecology of Semi-Aquatic Giant Gartersnakes (*Thamnophis gigas*). Herpetological Conservation and Biology 10(2):633-644.

Hayes, M.P. and M.R. Tennant. 1985. Diet and feeding behavior of the California red-legged frog *Rana aurora draytonii* (Ranidae). The Southwestern Naturalist 30(4):601-605.

Helm, B. 1998. Biogeography of eight large branchiopods endemic to California. Pages 124-139. *In* Ecology, conservation, and management of vernal pool ecosystems – proceedings from a 1996 conference, C. W. Witham, E.T. Bauder, D. Belk, W.R. Ferren, Jr., and R. Ornduff, eds. California Native Plant Society, Sacramento, California. 285 pp.

Holland, R. F. 1978. The geographic and edaphic distribution of vernal pools in the Great Central Valley, California. California Native Plant Society, special publication number 4.

Holland, R. F. 1998. Great Valley vernal pool distribution, photorevised 1996. Pages 71-75 *in*: C. W. Witham, E. T. Bauder, D. Belk, W. R. Ferren Jr. and R. Ornduff, editors. Ecology, conservation, and management of vernal pool ecosystems--Proceedings from a 1996 Conference. California Native Plant Society, Sacramento, California.

Holland, R. F. 2003. Distribution of vernal pool habitats in five counties of California's southern coast ranges. Report to U.S. Fish and Wildlife Service. Ventura, California. 23 pages.

Hunt, L. 1993. Letter to Marvin L. Plenert, Regional Director, U.S. Fish and Wildlife Service, Portland, Oregon, regarding proposed listing.

Jennings, M.R. 1996. Status of amphibian. Pp 921-944. *In* Sierra Nevada ecosystem project: Final report to Congress, vol. II: Assessments and scientific basis or management options. Wildland Resources Center Report No. 37 ISBN 1-887673-01-6.

Jennings, M.R. 1993. Letter to Peter C. Sorensen, U.S. Fish and Wildlife Service, Sacramento, California.

Jennings, M.R. and M.P. Hayes. 1985. Pre-1900 overharvest of California red-legged frogs (*Rana aurora draytonii*): The inducement for bullfrog (*Rana catesbeiana*) introduction. Herpetological Review 31(1): 94-103.

_____. 1990. Final report of the status of the California red-legged frog (*Rana aurora draytonii*) in the Pescadero Marsh Natural Preserve. Final report prepared for the California Department of Parks and Recreation, Sacramento, California through Agreement (4-823-9018). Department of Herpetology, California Academy of Sciences, Golden Gate Park, San Francisco, California. 30 pages.

_____. 1994. Amphibian and reptile species of special concern in California. California Department of Fish and Game, Rancho Cordova, California.

Jennings, M.R., M.P. Hayes, and D.C. Holland. 1992. A petition to the U.S. Fish and Wildlife Service to place the California red-legged frog (*Rana aurora draytonii*) and the western pond turtle (*Clemmys marmorata*) on the List of Endangered and Threatened Wildlife and Plants. 21 pages.

Kruse, K.C. and M.G. Francis. 1977. A predation deterrent in larvae of the bullfrog, *Rana catesbeiana*. Transactions of the American Fisheries Society 106(3): 248-252.

Launer, A., D. Murphy, J.M. Hoekstra, and H.R. Sparrow. 1992. The endangered Myrtle's silverspot

butterfly: present status and initial conservation planning. Journal of Research on the Lepidoptera 31(1-2):132-146.

Leyse, K. E., S. P. Lawler, and T. Strange. 2004. Effects of an alien fish, *Gambusia affinis*, on an endemic California fairy shrimp, *Linderiella occidentalis*: implications for conservation of diversity in fishless waters. Biological Conservation 118:57-65.

Lips, K.R., F. Brem, R. Brenes, J.D. Reeve, R.A. Alford, J. Voyles, C. Carey, L. Livo, A.P. Pessier and J.P Collins. 2006. Emerging infectious disease and the loss of biodiversity in a Neotropical amphibian community. Proceedings of the National Academy of Sciences of the United States of America 103(9): 3165-3170.

Loredo, I., D. VanVuren and M. L. Morrison. 1996. Habitat Use and Migration Behavior of the California Tiger Salamander. Journal of Herpetology 30(2): 282-285.

Mabe, J. 2017. Phone conversation from Jeff Mabe, U.S. Forest Service, Eldorado National Forest, to Ian Vogel, Service, Sacramento FWO, dated June 6, 2017.

Mayer, K. E., and W. F. Laudenslayer, Jr. 1988. A Guide to Wildlife Habitats of California. California Department of Fish and Game. Sacramento, California. 166 pages.

Moyle, P.B. 1976. Fish introductions in California: a history and impact of native fishes. Biological Conservation 9(1): 101-118.

Murphy, D.D. and P.R. Ehrlich. 1980. Two California checkerspot butterfly subspecies; one new, one on the verge of extinction. Journal of Lepidopterists' Society 34: 316-320.

Weiss, S.B. 1999. Cars, cows, and checkerspots butterflies: nitrogen deposition and management of nutrient-poor grasslands for a threatened species. Conservation Biology 13(6): 1476-1486.

Peralta-García, A., B.D. Hollingsworth, J.Q. Richmond, J.H. Valdez-Villavicentio, G. Ruiz-Campos, R. N. Fisher, P. Cruz-Hernandez, P. Galina-Tessaro. 2016. Status of the California red-legged frog (*Rana draytonii*) in the state of Baja California, México. Herpetological Conservation and Biology 11(1): 168-180.

Padgett-Flohr, G. 2008. Pathogenicity of *Batrachochytrium dendrobatidis* in two threatened California amphibians: *Rana draytonii* and *Ambystoma californiense*. Herpetological Conservation and Biology 3(2): 182-191.

Padgett-Flohr, G.E. and R.L. Hopkins, II. 2010. Landscape epidemiology of *Batrachochytrium dendrobatidis* in central California. Ecography 33: 688–697.

Pittman, B.T. 2005. Observations of upland habitat use by California tiger salamanders based on burrow excavations. Transactions of the Western Section of the Wildlife Society 41: 26-30.

Richmond, J.O., A.R. Backlin, P.J. Tatarian, B.G. Solvesky, R.N. Fisher. 2014. Population declines lead to replicate patterns of internal range structure at the tips of the distribution of the California red-legged frog (*Rana draytonii*). Biological Conservation 172: 128-137.

Riley, S. P. D., H. B. Shaffer, S. R. Voss, and B. M. Fitzpatrick. 2003. Hybridization Between a Rare,

Native Tiger Salamander *(Ambystoma californiense)* and its Introduced Congener. Biological Applications 13(5): 1263-1275.

Sawyer, J. O., and T. Keeler-Wolf. 1995. A Manual of California Vegetation. California Native Plant Society. Sacramento, California.

Seymour, R. and M. Westphal. 1994. Distribution of California tiger salamanders in the eastern San Joaquin Valley: Results of the 1994 survey. Prepared for Coyote Creek Riparian Station. Prepared for U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office.

Shaffer, H.B., G.M. Fellers, S.R. Voss, C. Oliver, and G.B. Pauley. 2010. Species boundaries, phylogeography, and conservation genetics of the red-legged frog (*Rana aurora/draytonii*) complex. Molecular Ecology 13: 2667-2677.

Shaffer, H.B., J. Johnson, and I. Wang. 2013. Conservation genetics of California tiger salamanders. Prepared for Dan Strait, CVP Conservation Program Manager, Bureau of Reclamation, Sacramento, California. Final report. Bureau of Reclamation grant agreement no. R10AP20598.

Shaffer, H.B., R.N. Fisher, and S.E. Stanley. 1993. Status Report: the California Tiger Salamander *(Ambystoma californiense)*. Final report for the California Department of Fish and Game. 36 pages plus figures and tables.

Singer, M.C. 1972. Complex components of habitat suitability within a butterfly colony. Science 176(4030): 75-77.

Stebbins, R.C. 2003. A field guide to western reptiles and amphibians. Houghton Mifflin. Boston, Massachusetts

Stone, R. D., W. B. Davilla, D. W. Taylor, G. L. Clifton, and J. C. Stebbins. 1988. Status survey of the grass tribe Orcuttieae and *Chamaesyce hooveri* (Euphorbiaceae) in the Central Valley of California. 2 volumes. U.S. Fish and Wildlife Service Technical Report, Sacramento, California. 124 pages

Storer, T. I. 1925. A synopsis of the Amphibia of California. University of California Publications in Zoology 27: 1-342.

_____. 1933. Frogs and their commercial use. California Department of Fish and Game 19(3): 203-213.

Swaim, K. E. 1994. Aspects of the ecology of the Alameda whipsnake *Masticophis lateralis euryxanthus*. Master's Thesis, California State University, Hayward. 140 pp.

Swift, C.C., J. L. Nelson, C. Maslow, and T. Stein. 1989. Biology and distribution of the tidewater goby, *Eucyclogobius newberryi* (Pisces: Gobiidae) of California. Natural History Museum of Los Angeles County, No. 404. P. 12

Tatarian, T.J. and G. Tatarian. 2008. California red-legged frog telemetry study; Hughes Pond, Plumas National Forest. Annual Report, Option Year 3 to: U. S. Fish and Wildlife Service, 2800 Cottage Way, Sacramento, CA and U.S. Forest Service, Plumas National Forest, 875

Mitchell Avenue, Oroville, CA.

_____. 2010. Chytrid Infection of *Rana draytonii* in the Sierra Nevada, California, USA. Herpetological Review 41(3): 325-327.

Tatarian, P.J. 2008. Movement patterns of California red-legged frogs (*Rana draytonii*) in an inland California environment. Herpetological Conservation and Biology 3(2): 155-169.

Terry, J. 2018. Electronic mail communication from Joseph Terry, Sacramento FWO to Catrina Martin, Sacramento FWO, dated August 2, 2018.

Twedt, B. 1993. A comparative ecology of *Rana aurora* Baird and Girard and *Rana catesbeiana* Shaw at Freshwater Lagoon, Humboldt County, California. Master of Science thesis. Humboldt State University, Arcata, California. 53 pages plus appendix.

U.S. Fish and Wildlife Service. 1980. Listing the valley elderberry longhorn beetle as a threatened species with critical habitat. Federal Register 45: 52803-52807.

_____. 1992. Endangered and threatened wildlife and plants; six plants and Myrtle's silverspot butterfly from coastal dunes in northern and central California determined to be endangered.

_____. 1994. Endangered and threatened wildlife and plants; designation of critical habitat for the least bell's vireo. Federal Register 59: 4845-4867.

_____. 1996. Endangered and threatened wildlife and plants; determination of threatened status for the California red-legged frog. Federal Register 61: 25813-25833.

_____. 1997. Determination of Endangered Status for the Callippe Silverspot Butterfly and the Behren's Silverspot Butterfly and Threatened Status for the Alameda whipsnake. Federal Register Vol. 62, No. 234. (pg. 64306). Dated December 5, 1997

_____. 1998a. Recovery Plan for Seven Coastal Plants and the Myrtle's Silverspot Butterfly. Portland, Oregon.

_____. 1998b. California Freshwater Shrimp *(Syncaris pacifica* Holmes) Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. 94 pp.

_____. 1998c. Recovery Plan for serpentine soil species of the San Francisco Bay Area. Portland, OR. 330 pp.

_____. 1998d. Draft recovery plan for the least Bell's vireo. U.S. Fish and Wildlife Service, Portland, OR. 139 pp.

_____. 2000. Endangered and threatened wildlife and plants; designation of critical habitat for the tidewater goby. Federal Register 65: 69693-69717.

_____. 2001a. Endangered and threatened wildlife and plants; final determination of critical habitat for the California red-legged frog. Federal Register 66: 14626-14758.

_____. 2001b. Endangered and threatened wildlife and plants; final determination of critical habitat

for the Bay checkerspot butterfly (Euphydryas editha bayensis). Federal Register 66: 21450-24189.

_____. 2002s. Recovery plan for the California red-legged frog (Rana aurora draytonii). Portland, Oregon. 173 pages.

_____. 2002b. Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California. Region 1, Portland, OR. xvi + 306 pp.

_____. 2003a. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Sonoma County Distinct Population Segment of the California Tiger Salamander; Final Rule, Federal Register 68: 13497.

_____. 2003b. Endangered and threatened wildlife and plants; final designation of critical habitat for four vernal pool crustaceans and eleven vernal pool plants in California and Southern Oregon. Federal Register 68: 46684-46867.

_____. 2003c. Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander. Sacramento Field Office, Sacramento, California.

_____. 2004. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the California Tiger Salamander; and Special Rule Exemption for Existing Routine Ranching Activities; Final Rule. Federal Register 69:47212-47248.

_____. 2005a. Endangered and threatened wildlife and plants; final designation of critical habitat for four vernal pool crustaceans and eleven vernal pool plants in California and Southern Oregon. Federal Register 70: 46924-46999.

_____. 2005b. Endangered and threatened wildlife and plants; designation of critical habitat for the California tiger salamander, central population. Federal Register 70: 49380-49458.

_____. 2005c. Endangered and threatened wildlife and plants; designation of critical habitat for the Sonoma county distinct population segment of the California tiger salamander. Federal Register 70: 74138-74163.

_____ 2005d. Recovery Plan for the Tidewater Goby (*Eucyclogobius newberryi*). U.S. Fish and Wildlife Service, Portland, Oregon. vi + 199 pp.

_____. 2005d. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. Portland, Oregon. xxvi + 606 pages.

_____. 2006a. Endangered and threatened wildlife and plants; final designation of critical habitat for four vernal pool crustaceans and eleven vernal pool plants in California and Southern Oregon. Federal Register 71: 7118-7316.

_____. 2006b. Endangered and threatened wildlife and plants; designation of critical habitat for the California red-legged frog, and special rule exemption associated with final listing for existing routine ranching activities. Federal Register 71: 19244-19346.

_____. 2006c. Endangered and threatened wildlife and plants; designation of critical habitat for the

Alameda whipsnake. Federal Register 71: 58176-58231.

_____. 2006d. Least Bell's Vireo (*Vireo bellii pusillus*) 5-year Review: Summary and Evaluation. Carlsbad, California.

_____. 2006e. Estimating the effects of auditory and visual disturbance to northern spotted owls and marbled murrelets in the northwestern California. Available at http://www.fws.gov/arcata/es/birds/NSO/ns_owl.html

_____. 2007a. Vernal Pool Fairy Shrimp *(Branchinecta lynchi)* 5-Year Review: Summary and Evaluation. Sacramento, California.

_____. 2007b. Vernal Pool Tadpole Shrimp *(Lepidurus packardi)* 5-Year Review: Summary and Evaluation. Sacramento, California.

_____. 2008a. Endangered and threatened wildlife and plants; revised designation of critical habitat for the tidewater goby (*Eucyclogobius newberryi*). Federal Register 73: 5920-6006.

_____. 2008b. Endangered and threatened wildlife and plants; designation of critical habitat for the Bay checkerspot butterfly (*Euphydryas editha bayensis*). Federal Register 73: 50406-50452.

_____. 2008c. Sacramento Orcutt Grass *(Orcuttia viscida)* 5-Year Review: Summary and Evaluation. Sacramento, California.

_____. 2009. Bay Checkerspot Butterfly *(Euphydryas editha bayensis)* 5-Year Review: Summary and Evaluation. Sacramento, California.

_____. 2009a. Callippe Silverspot Butterfly *(Speyeria callippe callippe)* 5-Year Review: Summary and Evaluation. Sacramento, California.

_____. 2009b. Myrtle's Silverspot Butterfly *(Speyeria zerene myrtleae)* 5-Year Review: Summary and Evaluation. Sacramento, California.

_____. 2010. Endangered and threatened wildlife and plants; revised designation of critical habitat for California red-legged frog; final rule. Federal Register 75: 12815-12959.

_____. 2011a. Endangered and threatened wildlife and plants; revised designation of critical habitat for the Sonoma county distinct population segment of California tiger salamander. Federal Register 76: 54346-54372.

_____. 2011b. Endangered and threatened wildlife and plants; revised designation of critical habitat for the marbled murrelet. Federal Register 76: 61599-61621.

_____. 2011c. California freshwater shrimp (*Syncaris pacifica*) 5-Year Review: Summary and Evaluation. Sacramento, California

_____. 2011d. Tidewater goby (*Eucyclogobius newberryi*) 5-Year Review: Summary and Evaluation. Ventura, California

_____. 2011e. Alameda Whipsnake (*Masticophis lateralis euryxanthus*) 5-year Review: Summary and

Evaluation. Sacramento, California.

_____. 2011f. California Freshwater shrimp *(Syncaris pacifica)* 5 year review: Summary and Evaluation. Sacramento, California.

_____. 2012a, Longhorn Fairy Shrimp *(Branchinecta longiantenna)* 5-year Review: Summary and Evaluation. Sacramento, California.

_____. 2012b. Conservancy Fairy Shrimp *(Branchinecta conservatio)* 5-year Review: Summary and Evaluation. Sacramento, California.

_____. 2012b. Endangered and threatened wildlife and plants; designation of revised critical habitat for the northern spotted owl. Federal Register 77: 71876-72068.

_____. 2013b. Endangered and threatened wildlife and plants; designation of critical habitat for tidewater goby. Federal Register 78: 8746-8819.

_____ 2014a. California Tiger Salamander Central California distinct Population Segment (*Ambystoma californiense*) 5-Year Review: Summary and Evaluation. Sacramento Fish and Wildlife Office, Sacramento, California. 63 pp. http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=D01T.

_____. 2014a. 12 month Finding and Proposed Rule to Reclassify the Tidewater Goby from Endangered to Threatened (Fed. Reg. 2014).

_____. 2014c. Withdrawal of the Proposed Rule to Remove the Valley Elderberry Longhorn Beetle from the Federal List of Endangered and Threatened Wildlife.

_____. 2016. Recovery Plan for the Santa Rosa Plain: *Blennosperma bakeri* (Sonoma sunshine)*; Lasthenia burkei* (Burke's goldfields)*; Limnanthes vinculans* (Sebastopol meadowfoam); California Tiger Salamander Sonoma County Distinct Population Segment (*Ambystoma californiense*). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California. vi + 128 pp.

_____. 2017a. Recovery Plan for the Giant Garter Snake (*Thamnophis gigas*). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California. vii + 71 pp.

_____. 2017b. Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander (*Ambystoma californiense*). Sacramento, California.

_____. 2017c. Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*). Sacramento, California.

Vollmar, J.E. 2002. Chapter 2: Landscape Setting. *In* J.E. Vollmar (editor). Wildlife and Rare Plant Ecology of Eastern Merced County's Vernal Pool Grasslands. Vollmar Consulting, Berkeley, California.

Wright, A.H. and A.A. Wright. 1949. Handbook of frogs and toads in the United States and Canada. Comstock Publishing, Ithaca, New York.

Wylie, G. D. and M. Amarello. 2007. Surveys for the current distribution and abundance of giant garter snakes (*Thamnophis gigas*) in the southern San Joaquin Valley. Prepared for the Bureau of Reclamation by the U.S. Geological Survey, Biological Resources Division, Dixon Field Station, Dixon, California.